

Marine Engineering And Shipping Age

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Steam

WITH the rapid development of the Diesel engine and its increasing importance in both land and marine service it is not surprising that popular attention has been largely held by the internal combustion engine and recent developments in other lines of heat engineering, in their way quite as remarkable, have received comparatively little attention. Nothing has played a greater part nor been a more important factor in the development of modern civilization than steam and in the steam engine the world has received, perhaps, its largest single contribution from engineering science and skill. It cannot be denied that the economies made possible by the adoption of internal combustion engines are, on the surface at least, revolutionary in character and it is not surprising that, in view of this, there are many who would have us believe that steam, as a motive power, has outlived its usefulness and that the practical elimination of the steam engine as a factor in manufacturing and trade is a matter of the near future. Without in the least wishing to detract from the many advantages which are already being derived from the use of internal combustion machinery, or in any way questioning the probability of far greater development and corresponding benefits to come, we are far from being ready to compose an epitaph for steam or to consign to the scrap heap, without further hearing or trial, such a proven friend and trusted servant as the steam engine has been to mankind in general for the past hundred years.

For service aboardship, the prime requisite for any machinery is undoubtedly reliability and the quality of ren-

dering continuous service under any and every condition of operation. To the fact that the steam engine and the turbine do render such service is largely due the reluctance of the average shipowner to replace them with any other form of prime mover, regardless of possible resulting savings. Unfortunately it is this same quality of reliability and the fear of decreasing it by the introduction of additional apparatus, or more trying operating conditions, that has tended to prevent the adoption in marine installations of many improvements which have effected marked savings in the operation of stationary steam plants. It is, of course, quite apparent that the limitations of sea service and the conditions under which marine machinery operate make impracticable the adoption of many devices or means which function successfully on shore, but there are others which, if applied to marine installations by skilled engineers having a personal knowledge of seagoing conditions and requirements, should produce economies of operation in line with what has been accomplished in stationary practice.

While we are fully aware of the danger of employing delicate or complicated apparatus on board ship, and of the entirely unsatisfactory results which have often followed its adoption, it has been our impression that in many cases where improvement in economy has been attempted by such means the principle involved was correct and failure resulted mainly from defective design of details indicating a lack of knowledge, on the part of the engineers or designers, of the peculiar and trying conditions which surround the operation of marine machinery. Nowhere, possibly, has such a condition been more apparent than on certain of the emergency vessels built during and shortly after the war. With machinery and auxiliaries conceived and installed evidently from a "power house" point of view, these ships proved veritable nightmares for their engineers and fell far short of the economy of operation in actual service at sea which the experience of their designers with stationary plants had led them to expect. Similar machinery, differing from the original only in details of construction, has since proved entirely satisfactory when designed and arranged in accordance with the dictates of actual marine experience.

One is led to hope that further gains in the economy of marine steam plants may result from the intelligent and practical application of principles which have been and are now being successfully worked out on shore. Although a horsepower is being produced at present for less than one pound of fuel oil in the most advanced marine installations, it seems reasonable to anticipate a further gain in economy as the

result of increased steam pressures, superheating, more efficient feed heating and improved boiler or combustion efficiency. Such improvements are not only possible but are actually being realized today. Large electric power stations ashore are producing a kilowatt with 1.1 pounds of coal, equivalent to about 0.83 pound per horsepower hour, and this with a widely varying load. (The power factor of the large New York stations is about 40 per cent.) With oil fuel and a constant load these stations would probably produce a horsepower for from 0.55 to 0.60 pound of oil per hour. While, as we have already remarked, some of the devices which are enabling the power stations to attain this economy of operation are, in their present form, unsuited to marine service, the principles involved may, in most instances, be applied to the latter with a resulting decrease in fuel consumption.

The mercury vapor turbine may be productive of wonderful results when interposed between the heat producer and the steam line to a power house turbine but our imagination will hardly stand the strain of visualizing such a machine on board ship. There are other and more practicable ways, however, by which the laws of thermodynamics are being successfully applied and are producing notable results and, although the steam engine or turbine, at any rate in any workable form for use on shipboard, is not likely to approach closely the performance of the internal combustion engine, it does appear that the gap between the two is susceptible of greater reduction than is usually thought possible.

How far the present type of steam plant may be modified or added to without impairing its reliability is an open question and it must be admitted, in all fairness, that in its most tried and perfected form, the Diesel leaves little to be desired on this score. The high cost of the latter is the greatest bar, at present, to its more extended adoption and, for this reason, any method which promises to result in increased economy of steam plants is bound to receive careful consideration, as making possible the extension of the limits within which steam vessels may be still considered as competitive units.

Improvement in economy of steam plants has been mainly effected during the past decade along five more or less distinct lines: Improved vacuum apparatus, increased steam pressures, superheating, feed heating and improved combustion or utilization of waste heat. So far as the first of these is concerned, and in it, for turbine installations, lies the greatest single means of improved economy, the adoption of jet air pumps and other similar forms of high vacuum apparatus has left little to be desired and it does not seem probable that any further improvement of material value is to be expected along this line. Higher steam pressures undoubtedly will come. The improvement due to increased pressures may not be proportionally as great as that resulting from improved vacuum, but it is, nevertheless, very material and in shore plants remarkable results are being attained by its use and still greater savings are promised by experimental installations now under trial. Superheaters are already in very general use on shipboard, but can only be utilized to the fullest advantage in connection with turbines. Improved feed heating by various methods, notably by the use of steam drawn from certain turbine stages, is giving very satisfactory results but, so far as we are aware, this method has not yet been

used on shipboard. The improvement in economy which may be effected by a more efficient utilization of uptake gases offers a broad field.

In this connection, certain tests of the Howden-Ljungstrom pre-heater, recently made at the Howden Works in Glasgow, are interesting. An abstract of a paper by Mr. Owen, of the Howden Company, describing these tests, appears elsewhere in this issue. The boiler economy and the resulting possible overall efficiency which the use of the pre-heater appears to indicate are rather startling, and we are not prepared to accept them without reservation until they are confirmed by tests of much longer duration, particularly where coal fuel is used. It may, however, be predicted with considerable certainty that a very material saving will be effected by the use of very highly pre-heated draft, provided, of course, that the apparatus can be so designed and constructed as to function satisfactorily over long periods in the face of the rather trying heat conditions under which it operates.

We are convinced that the internal combustion engine will eventually replace steam to a very great extent but the transition cannot take place at once as the problems involved are many and intricate and can only be solved by a considerable range of actual experience under varying conditions. In the meantime, there is very much left for steam to accomplish and the developments which we have touched on will undoubtedly have the effect of lengthening its lease of life.

The Knack for Shipping

IN an editorial on shipping, published recently in a middle west paper, the following statement appears: "Shipping is a business in which the present generation of Americans has no particular knack, and as a consequence this nation's effort can be more advantageously directed into channels where we enjoy some natural advantages."

The local interests and prejudices in a country such as ours are often as far apart as the states where they arise but it seems often to be the case that those who profess to voice the opinion of any particular section are inclined to assume that they are expressing the sentiment of the whole country.

It must, perforce, be admitted that the majority of our fellow citizens are not "ship minded" and in so far as our contemporary is indicating this condition, we agree with him. A large proportion of Americans have never seen the ocean or the Great Lakes and, in ordinary course, never will, but there are others, quite a few, in fact, who have seen them and who, by inheritance or contact, know ships. But coming from a section with the Great Lakes at its very doors, the implication that in all America there is no aptitude for marine matters is, to say the least, surprising.

If there is any industry where "particular knack" shows itself to greater advantage than in Great Lakes shipping, we have yet to hear of it. To an equal degree, although in a less striking and spectacular manner, native commercial and engineering ability has been evidenced in the development of the vessels which navigate the sounds and bays of the American coast. Nowhere has greater ingenuity been shown nor peculiar and trying conditions more successfully met than in the design and construction of these vessels. So far as sea-

going ships are concerned the vessels of the navy and the turning out in record time of the great emergency fleet speak for themselves; there is indication of some knack here.

We fancy that notwithstanding long continued trials and discouragement, the descendants of the men who built and manned America's merchant marine of the 50's, the men who built our navy and the men whose knowledge made possible the construction of the emergency fleet are not quite ready to agree that on the seven seas America's sun has set, nor are they ready to agree that, with a longer coast line, more ports, potentially greater sea-borne trade than any other country, we must stop at the water's edge, lacking the ability—the knack—to proceed further.

Specification By Law

UNDER the act establishing the Federal Budget System, provision is made for the organization of a Federal Specifications Board. The province of this board is the drawing up of specifications for all material, of every description, used by the various government departments. Under the law, the use of these specifications is made mandatory. In other words, the quality of all material bought for governmental activities of every sort is determined finally and absolutely by a single organization under the control of the Director of the Budget.

Insofar as this system tends to simplification, and the elimination of unimportant and annoying differences between the specifications heretofore issued by different departments, it is a good thing, an advantage to manufacturers, and should result in a considerable saving to the government. It was doubtless with this end in view that the formation of the Specifications Board was originally provided for. It is greatly to be hoped, however, that in the work of co-ordinating the requirements of the different departments, there will be no lowering of the standards that have already prevailed in some of the departments, notably in the Navy and War Departments.

While the specifications under which material has been furnished to the Navy, the Army and the Treasury Department, to mention but a few of the agencies using vast quantities of material, have often seemed burdensome, they have had a marked influence and are generally recognized as having increased the range and raised the general standard of quality of material manufactured in this country. Any attempt to lower the present high standards is to be deplored and calls for united and vigorous action on the part of all reputable manufacturers.

Indeed many of the specifications might with benefit to the Government be considerably stiffened up to take advantage of the lessons of the war. There are records of disastrous failures of material purchased by the Government under loose requirements or under specifications calling for too low grade material. Some of these records are in the hands of the Government officers but many are in the files of private manufacturers whose experience should now be made use of in drawing up all Federal specifications.

While the Federal Specifications Board is composed entirely of government officers, it has, we understand, appreciated the necessity of advice from private sources, and to this

end has requested Dr. Burgess, the director of the Bureau of Standards, to aid in the formation of advisory committees of private engineers and experts having particular knowledge and experience in different classes of manufactures.

The importance of this matter can hardly be overestimated. Certain of the specifications already issued and, in effect, made law, are distinctly inferior in requirements to the standard specifications drawn up by the American Society for Testing Materials, which undoubtedly represents the most advanced engineering practice of the country. Furthermore, we have been informed that certain government departments have already experienced difficulty in obtaining material of satisfactory quality under the requirements that are now being made standard and have been obliged to consider bids from irresponsible parties whom they well knew were unable to furnish materials of good quality at the prices quoted.

The engineers and manufacturers of the country have a most vital interest in the work of the Specifications Board and should see to it that the advisory committees are composed of high class men who actually represent the best there is in the many and vast industries which are vitally affected. Any slight saving which may, on the surface, appear to result from the opening of competition to anybody and everybody will be quickly wiped out in service by upkeep and replacement losses and in the end would result in a return to the loose and unsatisfactory conditions of thirty or more years ago.

The Adoption of Diesel Engines

AN editorial which recently appeared in the *Railway Age* on the electrification of railways applies so closely to the marine-Diesel situation, that with but slight change of names and dates it might be taken almost verbatim as applying to the latter. This article reads, in part, as follows:

"Thirty years ago electric locomotives were heralded as a new and improved form of motive power which would quickly find wide if not general application on all trunk line railroads. Following this declaration, an argument was started on the relative merits of alternating and direct currents for traction purposes. The railroad man, naturally chary of a tool with which he was totally unfamiliar, in many cases drew the conclusion that if the electrical men could not decide what kind of power ought to be used, then it was a good subject to let alone. This argument effectively retarded adoption of electric traction up to as late a date as 1922 and probably is still having some effect. Some of the enthusiasts, too, have been prone to resort to exaggeration to make electrification appear more attractive and the result, as might be supposed, was a boomerang. Recently, there has been relatively little said about power systems; an indication that both systems have merit and a prospective user must select the one best suited to his needs."

It would certainly appear that the conclusions to be drawn from the above plain statement of actual experience may well be taken to heart and pondered over by many of our present day marine engineers.

We believe its most ardent advocates will admit that the Diesel is still in a state of development and that the most advanced and highly perfected engines so far produced are really but outposts on the road to the final goal. In the meantime each of several successful engines has individual good points and, also we suspect, certain weaknesses, which are peculiar to itself, but nothing is permanently to be gained

and much will certainly be lost by exaggeration either for or against. Constant dwelling upon actual or assumed deficiencies of any engine, while forgetting that one's own choice may have shortcomings of a different sort, but equally serious, can in the end have but one effect, the hurting or retarding of the business as a whole. The shipowner, having little first hand knowledge and being obliged to base his conclusions upon the widely varying and conflicting statements of advisers who have allowed their enthusiasm or prejudice to overcome their better judgment, can hardly be blamed if he decides, as some appear to have done, that for the present at any rate the Diesel is "a good subject to let alone."

In justice to the builders of Diesel engines, we hasten to say that we have rarely, if ever, heard from them unfair or unjust criticism of a competitor, but we have heard from some self-constituted champions of different types exaggerated and ill-advised statements which if persisted in can only be harmful to all concerned. A conversation between the late George Westinghouse and one of his assistants, as related by a former official of the Westinghouse Company, disposes of the question clearly and briefly. At the time when the Westinghouse Company was building its first large steam turbine a defect which had developed in a turbine being constructed by a rival concern was drawn to his attention by one of the younger engineers at the great Pittsburgh plant. "From the manner in which you tell me this," said Mr. Westinghouse to the young man, "I take it that you assume the news is pleasing to me. It is not, for any happening which is prejudicial to one turbine affects all and can only delay their commercial adoption."

While the Diesel is still being developed, it is already a highly perfected and very efficient machine, amply able to justify itself. It behooves those who would promote the adoption of internal combustion machinery to be at once temperate in their praise and constructive in their criticism.

Naval Disarmament Versus the Merchant Marine

ON March 21, by a unanimous vote, the House of Representatives adopted an amendment to the Naval Appropriation bill by which the President is requested to enter into negotiations with Great Britain, Japan, France and Italy with a view to reaching an agreement to limit the construction of all types and sizes of naval vessels not already covered by the conference of 1921, as well as of air craft.

The Disarmament Conference with its resulting naval holiday dealt a body blow to the shipbuilding industry of this country. Nevertheless, the new conditions were accepted as opening the door to greater security for the world in general and as marking a distinct step in advance in international relations.

The interest of the general public has been lulled to sleep by the assurance that the conference had placed this country on a basis of naval equality with Great Britain and had given it a preponderance of sea power over Japan in the proportion of 5 to 3. It is upon some such idea that the recent action of the lower house of the Congress is presumably based; but what are the facts?

When the "scrapping" programs are completed, the capital ships in possession of America, Great Britain and Japan will stand in the proportion of 5, 5 and 3. This is the sum total of the physical effect of the conference. Actually the proportion does not hold as Great Britain and Japan are maintaining the capital ships remaining to them with full crews and in the highest state of efficiency while the Congress is refusing to maintain the United States battle fleet in comparable condition. It is necessary, however, to look further in order to get at the true inwardness of the situation.

Eliminating capital ships—in 1921, the three nations primarily concerned had in being, or under construction, light cruisers as follows: United States, 217,000 tons; Great Britain, 375,000 tons and Japan 164,000 tons. With capital ships restricted in action or eliminated, the light cruiser steps in as the controlling element of fleet power. What, then, happens to our fancied 5-5-3 ratio? It becomes, and for all practical purposes the physical naval ratio stands: Great Britain, 6.3; United States, 3.7; Japan, 2.7.

Discouraging as this may be to us, it is beside the point and does not really represent the greatest disadvantage under which this country labors. With either battleships or cruisers in service, their effective wartime operation is entirely dependent upon merchant ships and merchant sailors. With the naval vessels eliminated, the entire question of naval power is passed on to the merchant fleet.

Great Britain has in her merchant fleet over 22,000,000 gross tons, and at the end of last year had under construction over 1,400,000 tons.

America has a merchant fleet, aside from vessels on the Great Lakes, of approximately 14,500,000 gross tons and in December, 1923, had under construction less than 50,000 tons.

Japan has a fleet of 3,600,000 gross tons and is building over 60,000 tons. Germany is building over 300,000 tons.

If the ratio of naval power were to be theoretically maintained, merchant as well as war vessels would have to be limited in numbers. No one wishes any such action; but, by the same token, if naval power means anything at all to the people of this country, and we most certainly believe that it does, we *must* have more and efficient merchant vessels in order to make even a passable showing on the basis of comparison which the Disarmament Conference has, in effect, established.

The figures given indicate that the United States at present has a considerable merchant fleet. It must be remembered that a large part of the total is made up of idle vessels, many of which should be scrapped. Wanting energetic action, another five years will see this country helpless so far as offensive naval action is concerned and what is even more serious, the great shipyard organizations which made it possible to meet the crisis of 1915-16 will have been dissipated.

American bankers have recently lent \$100,000,000 to France, to "stabilize the franc." Practically coincident with this action, the French Government has trebled the subsidy under which its largest steamship company operates. In effect, we are furnishing the money to support and build up the merchant marine of a foreign country. Is it not about time that some constructive assistance was given to our own?

Section 28 of Merchant Marine Act Put Into Effect

Adequate Shipping Facilities Now Available to Handle Commodities Other Than Grain Between American and Certain Foreign Ports

By Harold F. Lane

WASHINGTON, D. C.

THE Shipping Board and the Interstate Commerce Commission have taken action to put into effect the provisions of Section 28 of the Merchant Marine Act of 1920, which have long been held in abeyance, which provide for limiting reduced export and import rates over the railroads of the United States to commerce handled by water in American ships. In accordance with a certificate issued by the Shipping Board following a resolution adopted on February 27, the commission, although it has previously expressed itself as criticizing the provisions of the law, issued an order lifting its previous suspension of the provisions of the act as to the traffic specified by the board.

Section 28 of the Merchant Marine Act, 1920, provides as follows:

That no common carrier shall charge, collect or receive, for transportation subject to the Interstate Commerce Act of persons or property, under any joint rate, fare or charge, or under any export, import or other proportional rate, fare or charge, which is based in whole or in part on the fact that the persons or property affected thereby is to be transported to, or has been transported from, any port in a possession or dependency of the United States, or in a foreign country, by a carrier by water in foreign commerce, any lower rate, fare or charge than that charged, collected or received by it for the transportation of persons, or of a like kind of property, for the same distance in the same direction, and over the same route, in connection with commerce wholly within the United States, unless the vessel so transporting such persons or property is, or unless, it was at the time of such transportation by water, documented under the laws of the United States. Whenever the board is of the opinion, however, that adequate shipping facilities to or from any port in a possession or dependency of the United States or a foreign country are not afforded by vessels so documented, it shall certify this fact to the Interstate Commerce Commission, and the Commission may, by order, suspend the operation of the provisions of this section with respect to the rates, fares and charges for the transportation by rail of persons and property transported from, or to be transported, to such ports, for such length of time and under such terms and conditions as it may prescribe in such order, or in any order supplemental thereto. Such suspension of operation of the provisions of this section may be terminated by order of the Commissioner whenever the board is of the opinion that adequate shipping facilities by such vessels to such ports are afforded and shall so certify to the Commission.

The U. S. Shipping Board had previously certified to the commission that adequate shipping facilities have not been afforded by vessels documented under the laws of the United States and accordingly the commission by orders entered June 14, 1920, July 27, 1920, and December 11, 1920, suspended the provisions of section 28 until further order of the commission.

On March 1, 1924, the commission received from the United States Shipping Board the resolution which the board adopted on February 27, 1924, and transmitted to the commission under date of February 29, 1924, certifying that adequate shipping facilities are now available to handle the transportation of all commodities other than grain between ports of the United States and ports of Great Britain and Northern Ireland and the Irish Free State, the ports of Continental Europe North of and including Bordeaux and the East Coast of Asia, the Islands of the Pacific Ocean, Australia and the East India Islands and the ports of Central and South America.

The commission announced that it construes section 28 as requiring it to lift the suspension of said section in accordance with the certification of the Shipping Board and accordingly by an order entered on March 11, 1924, the suspension

brought about by the three former orders above enumerated has been lifted with respect to the traffic above described.

The interstate commerce act provides that all rates and charges of common carriers between points in the United States shall be published and filed in accordance with regulations prescribed by the commission. The commission has therefore felt it necessary that sufficient notice be given of the lifting of the suspension to enable carriers to amend their tariffs in an orderly manner. Accordingly it has made its order effective May 20, 1924, and has provided for publication upon not less than 15 days' notice in lieu of the 30 days' notice usually required, in order that all parties interested may be fully advised and that as little confusion and disturbance of commercial conditions as possible will result.

SHIPPING BOARD OPPOSES TRANSCONTINENTAL RAIL RATE APPLICATIONS

The United States Shipping Board has adopted and sent to the Interstate Commerce Commission a resolution protesting against the granting by the commission of a pending fourth section application filed by the transcontinental rail lines for authority to establish rates to Pacific Coast terminals lower than the intermediate rates to meet the competition of water lines through the Panama Canal. The resolution states that such application by the rail carriers is an effort to divert traffic now being transported by ships operating in the intercoastal service through the Panama Canal which "have been utilized as a competitive artery of transportation on commodities moving between the Atlantic and Pacific seaboard and has resulted in the development of a large volume of commerce of great benefit to the producing, consuming and manufacturing portion of our population." It is also stated that: "It is believed by the United States Shipping Board that the application of the rail carriers is made in contemplation that it will drive the ocean carriers from this competitive trade through diversion of the commerce now being so carried in fair competition"; and that "Any destruction of the favorable and economical competitive transportation of commerce from the Pacific to the Atlantic seaboard through the Panama Canal would be injurious to the public interest."

CONSOLIDATION OF SERVICES

The Shipping Board has given its approval to a plan presented to it on March 7 by President Palmer of the Emergency Fleet Corporation for the consolidation of the services from North Atlantic to Scandinavian ports and the selection of Moore & McCormack, of New York, as the managing operator of the consolidated service. This is the first of a number of such consolidations to be recommended by the Fleet Corporation to the board during the next few months, for the purpose, it is announced, of bringing about greater business efficiency and to meet the reduced appropriations for the operation of the government merchant fleet which have been recommended to Congress by the Bureau of the Budget. The Shipping Board last year adopted the principle of consolidating freight routes. The consolidation which has been approved eliminates from the services C. H. Sprague & Co., and the East Baltic Line. The change in management will be effected as the vessels return to United States ports.

Mr. Palmer stated that Moore & McCormack will operate

the service for a time under the present MO-4 managing agency agreement and a new contract to replace it will be negotiated. A trade name will be selected for the Scandinavian service. Four of the twelve vessels now in the service are to be eliminated. In explanation of the plan President Palmer has issued the following:

"Consolidations of existing freight services, the first of which was recommended to the Shipping Board March 8, mean a further advance toward putting our merchant marine on a firm basis. By placing each service between a domestic and a foreign range of ports under a single control, the one agent charged with the development of the service is able to route his ships more flexibly and to avoid conflict with those of any other operator.

"Two outstanding reasons for the proposed consolidations are better and more prudent business methods, and the necessity for making the best use of the smaller number of ships that the reduced appropriations permit us to operate.

"Under the present appropriations about \$35,000,000 is available to make up the losses in the operation of our cargo vessels. With the greatly reduced appropriation for the coming fiscal year, there will be available approximately \$10,000,000 less for this purpose. It is evident that only through the adoption of better business methods and the strictest economy can such a cut be met, and at the same time reasonable services to American shippers and importers be maintained.

"There has been no reduction in the operating costs, nor sufficient increase in freight rates to permit operation on the present scale within the reduced budget figure. The savings must, therefore, be effected by re-organization of the services and also by reductions in personnel that will not interfere with efficiency, and by other economies.

"There appears to be a widespread feeling that the losses today due to the operation of the government ships by private organizations are much too great. The feeling exists that the general methods of operation do not represent as efficient handling and as much attention to business principles as is desired by people of the country who must pay the costs.

"Yet the people are demanding that we have a merchant marine strong enough to carry a fair share of our commerce, to protect our shippers and importers from exorbitant rates, and to provide a most valuable arm of our national defense. They are demanding also, however, that this shall be done with reasonable attention to business principles and economy.

"The Fleet Corporation is convinced that the proposed consolidation will not only be of great assistance in keeping within the appropriations made by Congress for the next fiscal year, but will also so far reduce the operating losses now suffered by its ships that the possibility of their sale will be materially improved. The best prospect for our merchant marine is not in continued divided effort. It is in reasonable concentration of effort, but in recommending to the board any such concentration, the Fleet Corporation will carefully guard the interests of each community to see that they are adequately served.

"The reduction in the number of ships operating, as well as the reduction in the number of operators, may be expected to be unwelcome to some of the operators who have sailed them under MO-4 agreement and this is only human. However, every million dollars that can be taken off the annual appropriation made for the operation of the ships, lifting the burden from the taxpayers, should make additional friends for the American merchant marine."

PORT OF BOSTON WILL NOT BE SLIGHTED

Mr. Palmer stated that apprehension on the part of New England shippers that the port of Boston would suffer as the result of the consolidation into one service of the three Scandinavian services of the Fleet Corporation is unwarranted. Mr. Palmer said the fact that the firm of Moore & McCormack, of New York, had been designated as the single managing operator of this consolidated service, after careful study of the qualifications of the three operators, does not mean that that firm will in any way slight the port of Boston in its service. The consolidation, Mr. Palmer added, was made on purely business-like and economic grounds and is destined to render a more flexible service for all North Atlantic-Scandinavian ports.

Under the direction of the Fleet Corporation, Moore & McCormack will have an experienced agent in Boston to maintain close contacts with shippers who desire to send their goods out of the port of Boston, and Boston shipments will be handled with promptness and dispatch. As an evidence that the Fleet Corporation recognizes the importance of the port

of Boston, it was decided that its office in Boston should no longer be subsidiary to the New York Office, but is of sufficient importance to be established as an independent office, reporting direct to Washington.

EDMONDS MARINE BILL

Representative Edmonds of Pennsylvania has introduced a bill, H.R. 7685, to amend and supplement the Merchant Marine Act, 1920, which provides for the creation of a marine division in the Department of Commerce in which would be consolidated all shipping and navigation matters not now under the Shipping Board. It also provides for co-ordination of rail and water transportation through a joint board composed of members of the Shipping Board and of the Interstate Commerce Commission. The bill also carries several provisions similar to those in the late subsidy bill. One part of it would amend Section 28 along the lines of the recommendation of the Interstate Commerce Commission so as to permit suspension of the section whenever the board and the commission are both of the opinion and certify that putting into effect or keeping in effect its provisions would result in unjust discrimination between ports of the United States or commerce accustomed to move through such ports or in materially changing the channels of transportation within the United States or in unduly congesting one or more of the ports of the United States.

ADVISORY SHIPPING COMMITTEES NAMED

President Coolidge has appointed two advisory shipping committees, one to consider coordination of rail and water transportation and the other to study the replacement needs of the American merchant marine. This action was suggested to the President by Senator Jones in a memorandum on the situation of the Shipping Board in December. The committee on coordination of rail and water transportation is to consist of Secretary Hoover of the Department of Commerce, Chairman Hall of the Interstate Commerce Commission, Chairman O'Connor of the Shipping Board, President Palmer of the Emergency Fleet Corporation, a practical railroad man and a practical shipping man. The replacement committee includes Secretaries Mellon of the Treasury, Weeks of the War Department, Hoover of the Commerce Department, Wilbur of the Navy, Chairman O'Connor and President Palmer. This committee has already held a preliminary conference with the President.

HOUSE COMMITTEE TO INVESTIGATE SHIPPING BOARD

Under a resolution adopted by the House on March 4 the Speaker has appointed a committee to inquire into the operations, policies and affairs of the Shipping Board and the Emergency Fleet Corporation, consisting of Representatives White, of Maine; Cooper, of Wisconsin; Lehlbach; Lineberger; Davis, of Tennessee; Bankhead; and Connally, of Texas. The resolution provides that the inquiry shall include an investigation of contracts, leases, sales, settlements, accounts, expenditures, receipts, assets, liabilities, properties and any and all transactions, affairs, policies and plans of the board and of the Fleet Corporation, and any other corporations, firms, individuals or agencies in any way associated with or controlled or regulated by the board or the Fleet Corporation from the date of the passage of the several acts creating the same, together with an inquiry into such other pertinent matters as may aid the committee in determining and recommending future policies with respect to the Shipping Board and Fleet Corporation and the properties and agencies under their control.

An order of the Shipping Board discontinuing its only route in the intercoastal trade has been rescinded and the North Atlantic & Western Steamship Company, managing agent, has been granted an extension to continue operating vessels between North Atlantic ports and Portland, Ore.

Encouraging Signs in Washington

Modification of the German Treaty and Application of Section 28 Will Stimulate American Shipping

By "Old Scotch"

THERE is an old adage which states "That it is always darkest before dawn." This seems to be particularly applicable to the outlook for American shipping at this time. Low freight rates and high costs of operation, combined with many other discouraging conditions, have for the past six months and more, made the prospects for shipping in this country anything but propitious.

Within the past fortnight, two events have transpired which bring much encouragement to those of us with vision who can look forward to possibly better times as incidental to these happenings.

TREATY HANDICAPS RECEIVING ATTENTION

The first and most important is the apparently successful efforts which have been concentrated by both Republican and Democratic leaders against the "most favored nation" clauses in the pending treaty between the United States and Germany. These treaty handicaps to the development of American shipping were recognized by the framers of the Merchant Marine Act of 1920, and in Section 34 of that popularly called Jones Act the Executive was directed to give notices to all countries with which these treaties had been made of the termination of those articles or provisions in the treaties which prevented us from giving preferential treatment to our shipping in foreign trade, both in regard to customs duties and tonnage dues. For causes unknown to the general public, three successive Executives have failed to carry out the provisions of that act, and the net result is that, if we should ever desire to give preferential treatment to our own ships engaged in trade with the respective powers with which we had made these treaties, we are still debarred from so doing, during the terms for which these treaties were made.

Although Congress by a non-partisan vote had approved this procedure, it is proven that it is impotent to bring about the desired changes without the approval and cooperation of the Executive.

THE NEW TREATY WITH GERMANY

Of course, when Germany ran amuck in the World in 1914, all previous treaties and conventions between that country and the United States became nullified. Now since diplomatic relations have been resumed between these countries, it becomes necessary to enter into other treaties for the transaction of trade and other international relations. It was but fair to assume that our State Department would have prepared a new treaty embodying the expressed wish of Congress regarding shipping, as contained in Section 34 of the Merchant Marine Act of 1920, as that was the last word from the law-making body on the subject. Fair assumptions, however, were rudely jolted, when it was found that the new treaty contained the same clauses as had existed in the pre-war treaty with Germany, so far as our shipping interests are concerned.

This bears out the wisdom of another time-worn maxim that "Eternal vigilance is the price of safety." Whether or not these clauses were embodied in the treaty draft, through sinister influences or not, matters but little, so long as they have been discovered in time for shipping people to make the vigorous protests which they have delivered to the Foreign Relations Committee of the Senate. The National Merchant

Marine Association, of which Senator Ransdell is the active president, was on the job, and added its weight and influence against the articles in the treaty, which may mean so much to the future of our merchant marine. This serves to illustrate the necessity of having an organization in Washington, which will closely scan all pending legislation, which either by design or accident may be detrimental to the best interests of our merchant marine efforts. The complex of legislation is such that it requires expert observation at all stages of each session of Congress to know what national interests are affected in almost every measure that passes. There have been instances of clauses inserted hastily in bills after they have left the committees having charge, and where most careful scrutiny is given them, which have not been known even to executives of the Government departments having administrative charge of the matters affected.

SHIPPING LEGISLATION IS A NATIONAL ISSUE

In this column frequent reference has been made to the fact that the best legislation obtained for the merchant marine in the past has been of and by non-partisan effort. Shipping is strictly a national issue, and, as such, should receive the whole-hearted support of all political parties. In the case of the pending treaty, the best augury for its ultimate ratification, without the inclusion of the obnoxious clause referred to, is the fact that both Republicans and Democrats have appeared before the committee to argue against the covenants which would restrict the treatment of our own shipping as we may see fit. The question of whether or not we will ever resort to discriminating customs and tonnage dues is not now under consideration. We must first positively state our right to resort to such methods to encourage our shipping, if we see fit so to do in the future.

If we allow these treaty restrictions to stand, we would be, in the family of nations, to use a homely comparison, very much like a man having a large family and running a hotel with an agreement posted over the desk proclaiming that all people registering at his hostelry would be treated exactly like his own dependents. If he saw fit to compel his children to eat oatmeal for breakfast, all other children must eat it; if his wife be an invalid, and needed broiled chicken to up-build her, then every one else among his patrons must forsooth partake of that delectable food. How would such an inn succeed, you would logically ask? The answer is just about as well as we are succeeding with American ships in the foreign trade under the existing treaty obligations.

Nations are but aggregations of individuals, and the same code of fairness of treatment which exists among individuals is good enough to use among nations. There is no individual father, who will not give his own children preference over those of his neighbors. In the matter of American shipping, it is akin to a physically backward child in a family. Following out the analogy, is there any reason why it should not be given parental care and guidance, when it must meet, in the competition for existence, the stronger and older children of the neighbors' families? Only savages kill off their crippled children!

Fortunately for our backward shipping interests, the present indications are that the modified treaty with Germany will soon be ratified, and it is hoped that in its modified

form it will serve as a model treaty for all which are to follow.

SECTION 28 BECOMES EFFECTIVE

The other favorable action which has transpired is the notice served on the Interstate Commerce Commission, by the Shipping Board, that "adequate shipping facilities to or from any port in a possession or dependency of the United States or a foreign country are afforded" by vessels "documented under the laws of the United States." This makes active the famous Section 28 of the Merchant Marine Act of 1920, which permits preferential rates or fares by the railroads and other common carriers on property or to persons destined for ports outside the United States, providing the persons or property travel or are shipped on American vessels. There is no "if," "and" or "but" about this matter, as it is already statutory law, and only needed the notice from the Shipping Board to the Interstate Commerce Commission to make it effective. It will be very far-reaching in its effect, and, judging from the criticisms and protests made against it from foreign steamship interests, it must be concluded that it will eventuate in much good to American shipping.

The matter of railroad rates is a most complicated and technical subject, and far be it from this writer to attempt to analyze how this preferential treatment will result. From an ordinary, commonsense viewpoint, it would appear for example that, if a resident of Chicago were going to Europe, the railroad companies could offer him a reduction of fare to New York, of say \$5 of \$10, providing he could prove that he was going to sail on an American vessel, or if a farmer in

Kansas had a thousand bushels of wheat to ship to the Liverpool market, the railroads would be authorized to make a rate of several cents a bushel less to Baltimore or New Orleans, or from whatever port it was to be shipped, providing the grain was carried in a vessel documented under the laws of the United States.

It would appear to the unbiased reader as if such a procedure would be of great advantage to American shipping, providing the differential in rate is made of sufficient amount to overcome the difference in the cost of operation between American and foreign vessels.

THE OBSTRUCTIONISTS

Of course, there are those among us, who will set up a howl against this measure, because they will at once claim that one port is favored against another, and undoubtedly the way of the rate maker will be no bed of roses until these rates are equitably adjusted, if they ever can be, to the satisfaction of all ports and sections.

Nevertheless and notwithstanding, this very method has been and is now being practiced by many of our foreign competitors in the shipping business. It, more than any other policy, was responsible for the upbuilding of the German merchant marine before her suicidal days. Now, because the great big, good-natured United States wants to adopt similar methods for the upbuilding of our own merchant marine, we will at once become unfair, and the target of all kinds of vituperation and threats of retaliation.

As before said under similar conditions, "Let 'em retaliate. Two can play at that game."

Modern Food Terminal Proposed for New York City

IN a paper on "The Food Supply and its Distribution to Greater New York" read before the Brooklyn Engineers' Club on February 14, William T. Donnelly, consulting engineer, New York, described in detail the present primitive and uneconomical methods of handling and distributing the food supply in New York City and suggested as a remedy the location of food terminals upon the waterfront at the most advantageous points for connection not only with the main trunk rail lines from all directions but also with equal accessibility to all water lines.

Based on recent surveys the daily weight of food to be handled and distributed in New York city amounts to 20,000 tons and its daily cost is approximately \$8,000,000. Practically all of this food must be produced in the open country far from New York City and many items come from the farthest corners of our own country and even from the most remote foreign countries. The average distance is estimated to be 1,500 miles.

More than 70 percent of the food supply arrives in the city in freight cars, only a small percentage of which are of any special construction or design to adapt them to the particular purpose for which they are used. The cars are floated across the waterways surrounding New York on carfloats and arranged in slips alongside of piers. From these cars the food is removed by hand trucks without the aid of a single mechanical device of any kind. None of the piers is new, and the entire equipment including the carfloats has not been changed or modified in the last forty years.

A careful comparison of the auction prices for fresh fruit and vegetables sold at the entry points, where the transfer is made from the railroad gatherer and carrier to the local receiver and distributor, with the retail cost at the neighborhood store where the food is purchased by the consumer brings out the startling comparison that fresh fruit and vegetables sold

for \$1.00 at the points which may be designated as the port of entry to the city cost \$2.00 when purchased at the final point of distribution. In other words, fresh food can be grown, paid for and transported an average distance of 1,500 miles for the same amount of money that it is necessary to pay to handle and distribute it an average of ten miles between the port of entry and its final destination.

The food terminals proposed by Mr. Donnelly would be provided with every modern device for the receipt, care and dispatch of this class of freight, including the loading and unloading of cars. Between the food terminals and substations located at strategic points on the waterfront would be developed the most modern system of water transportation and from the substations to the final distribution points the most modern system of land transportation. By locating the warehouse on the edge of navigable waters, where it can be equally served and serve equally both the land and the water carrier, it will have, according to Mr. Donnelly, an opportunity to fulfill its proper function, that of a flywheel of commerce, with consequent savings in time and cost of distribution of the food.

Representation Needed

AMONG the members of the present Parliament of Great Britain there are 109 who are either shipbuilders, shipowners or otherwise interested in shipping.

In the present Congress of the United States there are no members having any direct interest in shipping affairs.

If the time ever comes when the country can be made to see that it is not only a patriotic duty but "good business" to have in the Congress men who know, from personal experience, the economic requirements of the nation and the necessity for sane and conservative consideration of great national problems, we may then look forward, with some hope, to constructive action and a criterion of values founded on basic worth rather than vote-getting possibilities.



Present Quarters of the Seamen's Branch Y. M. C. A. in New York on Any Evening

What the Y. M. C. A. is Doing for Merchant Seamen

Twelve Seamen's Branches at Home and Foreign Ports Provide for the Welfare of Sailors While Ashore

IT has been estimated that in the port of New York alone about 30,000 seamen are on shore leave daily. While in port, these sailors need a clean bed to sleep in supplied at a reasonable price, good food, facilities for storing their dunnage, a safe place where money will be safe-guarded for them, writing tables and stationery for correspondence, a place to receive mail, obtain employment without charge, to purchase supplies needed for the next voyage at fair prices, a place for study and worship, an opportunity to learn about good citizenship and a suitable place to meet people from home. In short, these men want to find the comforts and companionship so sorely needed by wanderers and, in addition to the social and recreation activities available, often-times require attention when sick and advice when in trouble.

These are the seamen's needs—simple, fundamental wants—and yet vital to his growth as a good citizen and sailor in our merchant fleet. Seamen do not ask for charity but insist on and desire to pay for service rendered. A man looks with disfavor and suspicion on any attempt to give him something for nothing. There are times, however, when he is without the means to pay for such service. At such times he should at least have the necessities for every-day existence for which normally he is willing and able to make a return.

MERCHANT SEAMEN'S BRANCH Y. M. C. A. ESTABLISHED

The Merchant Seamen's Branch of the Y. M. C. A. has been organized with the object of providing such service for sailors ashore in the port of New York and in various other ports throughout the world. The New York branch is at present located at 525 West 23rd street and its doors are open at all times to seamen who in any way have a demand

to make on its service. This branch was started December 15, 1922, by a committee of management made up of individuals who felt that here was a broad field for humanitarian work. Since that time it has been liberally supported by a few men of vision and has enlisted the hearty moral and financial aid of several steamship companies whose directors have a conception of the value of such activities among those who man their ships.

That a real demand is made upon this service may be realized when the statistics of work done during the year ended December 31, 1923, are reviewed. In this period the attendance at various activities of the center total 238,232 men. Of these, 5,659 attended 78 religious services. There were 109 hospital visits, 859 ship visits at which 93,000 men listened to group talks and were interviewed. Ninety-seven thousand magazines were distributed, 228 social events were held with an attendance of over 19,205. Over 2,966 men attended 27 athletic events. Twenty-six civic forums were held with a total of 2,700 attendants. Eight concerts and lectures were given for 1,475 men; 6,920 interviews about personal affairs were held. Thirty-seven thousand, two hundred and twenty meals were served. Fifteen thousand, three hundred and forty lodgings were given and, during the past 3 months 1,500 men were directed to other places who could not be accommodated at the branch. Seventy-five special events were held for cabin boys, such as visits to the museum, aquarium, "at home" hours, etc., with an attendance of 1,146.

RECREATION FOR MEN ASHORE

The drudgery and monotony of life at sea arouses a desire for recreation among the men and this is filled while they

are ashore with a varied program comprised of motion pictures, concerts, boxing, educational lectures, sight-seeing trips, dances, afternoon and evening "at home" hours and numerous impromptu affairs which help to make the stay in port attractive.

Many men take advantage of the use of the library and in the yearly report it is stated that books have been used over 900 times, not to mention thousands of magazines and daily papers distributed. Some 16,000 letters to mothers, fathers, sisters, wives and sweethearts have been written on stationery supplied by the branch which might never otherwise have gone and, in return, over 11,000 letters have been forwarded through the branch.

SAVINGS BANK SERVICE

Advantage is taken of the depository for money at the "Y" to the extent of some \$21,000 in the course of the year, a certain percentage of which deposit has been banked through the Morris Plan Bank, thus creating not only a savings fund for some of the men but an actual investment; for the interest return is fairly high, making it an attractive investment.

Through the thoroughly organized bureau of employment some 3,600 men were placed in good positions in the course of the year. Where any of them have been without funds, they have been taken care of with food and lodging until such time as they were able to find work. Forty men have been sent to hospitals for treatment and frequent visits have been made to the men while sick. The system of ship visits to both incoming and outgoing vessels has been carried on with a high degree of regularity. The purpose of these visits is to get full information as to the personnel of the officers and crew to find out the special needs of any particular member of the crew and to supply insofar as possible the games and magazines needed. This information is also transmitted through the use of standardized ship reports to other branches operating at the next port of call or destination so that the service begun here may be carried on with regularity by co-operating branches, thus making the service of the Young Men's Christian Association international in character.

It is of interest to know that through the courtesy of many publishers, the organization has been able to supply some 23,000 magazines of late editions to the crews of ships leaving New York and several thousand other copies have been shipped to overseas branches for use in supplying vessels leaving for ports, where there is not at present an organization doing work for seamen.

EXPANSION PLANNED

The work has grown to such proportions in a comparatively short time that the need for better facilities has led this branch to take an option on a six-story building at 543-547 West 23rd street. With proper support these plans will mature within a short time and funds now available

practically assure the success of this great undertaking.

A tentative layout of the building includes fitting up the top three floors as individual sleeping rooms to accommodate 250 men with separate sections for officers and for stewards, deckhands and firemen. Special care will be taken with the section for boys (apprentices, cabin boys and deck boys) to make their surroundings as congenial as possible and compensate to a certain extent for the lack of home influence while they are in port. A completely equipped gymnasium will be fitted in the basement.

The first floor will contain a lobby, game rooms and a cafeteria to accommodate nearly 1,000 men. A clinic, an extension educational department and social and religious activities will be carried on here on a more extensive scale than has been possible with the present facilities where the quarters are inadequate.

OTHER BRANCHES

Other "Y" branches for carrying on work for sailors in this country are located in Brooklyn, Hoboken, Newport News, Va., and Seattle. In general, the procedure for serving the men is the same as at the New York branch.

The Brooklyn or "Bethelship" Seamen's Branch was the first building to be devoted to marine "Y" personnel interests. It was put in service in 1922. A branch in rather restricted quarters had been carried on for the four preceding years at the same location. "Bethelship" Seamen's Branch was made possible by a generous gift of Mrs. James Harvey Whitney in memory of her husband. The records of this division show that over 200 seamen have slept there nightly. Employment for more than a hundred men has been negotiated every day. A restaurant, barber shop and dunnage room are other features

which minister to the necessities and comforts of the men. An infirmary with three beds is available for emergencies.

FOREIGN BRANCHES FOR AMERICAN SAILORS

Besides the branches in the United States there is one at Havana, Cuba, and one at Kobe, Japan. In Europe, branches are located at Liverpool and London, England; Le Havre, France; Hamburg and Danzig, Germany. This system of 12 branches practically reaches around the world and, as time goes on and more branches are available, the American sailor, no matter where in the Seven Seas he may be wandering, will always be within a short reach of friends who understand his needs and are ready to help him. The branch in London is under the charge of G. D. Whitehead while at Liverpool Miss Ethel Fischer, patrol secretary, has been remarkably successful in her service to American seamen.

These foreign branches work very closely with the American consulates in various countries and are able to help many sailors who are stranded in foreign ports to get on their feet again. If the men are out of funds, a free employ-

(Continued on page 212)



Proposed Headquarters of Seamen's Branch
of Y. M. C. A. in New York

Safety Committees Reduce Accidents on Lake Vessels

Number of Serious Personal Injuries Greatly Diminished by Application of Safety Plan Devised by Lake Carriers' Association

By George A. Marr*

WATER-BORNE commerce on the Great Lakes involves the movement of over 100,000,000 tons of bulk freight in a navigation season of only 8 months. On an average haul taken at 800 miles the ton mileage service exceeds one-fourth that of the railroads in this country. Lake ships load and unload at 12 ports on Lake Erie and at 11 ports on the upper lakes. With the facilities at hand for the quick taking on or discharging of cargo, the average stay in port is a matter of only a few hours at the most. Under such conditions, with the resultant pressure and strain upon vessel operations and personnel, the question of safeguarding the men who man the ships becomes important.

To a large extent, the great body of lake seamen is made up of steady working reliable young men who "follow" the lakes year after year and are representative types of fine young Americans. Nevertheless, there is actually a large element of inexperienced men constantly employed upon these vessels. From its inception, the Lake Carriers' Association has sought to do the best that it can for the men employed aboard the ships enrolled in its membership. The vessel membership of the association has ranged from 350 to 410 steamers and 23 steel barges of average steamer size. The personnel of this fleet will number at any time 12,500 officers and men without allowance for turn over. The available man power in the course of the season will total approximately 25,000 different individuals. From the nature of the lake trade, the size of its fleet, the method of quick operations and the army of men employed, it is at once apparent that a method of safety effort such as is employed on railroads, in factories, mills or elsewhere ashore would be utterly impossible to employ on shipboard. This situation precludes any possibility of establishing safety work on the vessels under the conduct of men skilled in promoting or supervising such work. It therefore devolved upon the membership of the Lake Carriers' Association to depend upon their ingenuity for the solution of the problem.

SHIP SAFETY COMMITTEES ESTABLISHED

In 1917 a plan of a ship safety committee was conceived that possessed a marked ingenuity and originality. The plan provided for the appointment on each vessel of a ship safety committee to consist of six members of the crew, three from the forward or navigating end of the vessel, and three from the after end or engineer's department, the selection of men to consist of the lowest licensed officer on each end of the ship, two unlicensed men from the deck crew and two from the engineer's department, but not more than one of any rating or grade. The master appoints one licensed officer to act as chairman, the other as secretary. While the chief officers of the ships are not designated to serve on the committee, the purpose being to place upon the men who actually do the work the duty of studying and correcting the hazards and to enlist the interest of the rank and file of the unlicensed men, they generally attend the committee meetings, lending advice and encouragement.

The ship safety committee being required to hold a meeting once each month, compensation for each member was fixed at \$2 for each meeting attended, with a bonus of \$10 additional to be paid at the end of the season provided the member attended all meetings, but not less than six meetings held

during the navigating season, and further provided that no personal injury occurred on the ship or to a member of the ship's company in connection with his duties, sufficient to cause him to leave the ship. Pads of printed forms for recording the minutes of the meetings are supplied to the ships, one copy of which is sent to the vessel manager and another to the Lake Carriers' Association.

After trying out the ship safety committee on some of the ships in the fall of 1917, the plan was actively started at the opening of navigation in 1918 when the owners of 137 steamers in the membership of the Lake Carriers' Association authorized their masters to organize committees. Briefly, the duties of the ship safety committee were: Give special thought and attention to the details of operation in each member's department as shall further the general safety of the crew and others on shipboard; familiarize themselves with the recommendations made by the Industrial Committee; to hold a meeting once every month and carry out such steps as they might find advisable or have authority to carry out.

With ship safety committees functioning on 137 steamers and with six members to a committee this made at least 822 men constantly and seriously advocating the principles of safety on shipboard. Although the work was new and the men had to work out their own methods, the committees were not long in finding themselves and good results obtained before the season was half over. As the season advanced and the reports covering personal injuries came in in diminished numbers in comparison with preceding years, it became clear to the welfare committee that at last the right chord had been struck.

ACCIDENT REPORTS IMPORTANT

It has been the custom for all masters to report in detail to the Lake Carriers' Association personal injuries sustained by members of the crew. Lists of current personal injuries are published each month which receive earnest deliberation in ship safety committee meetings with means taken to prevent recurrences. On ships where committees do not prevail these reports of personal injuries are read over by members of the crew and thus they serve a useful purpose throughout the entire fleet. A digest of noteworthy suggestions that develop in committee meetings is also published for the general benefit.

TRAINING THE MEN TO THINK SAFETY

Naturally many of the suggestions originating with the ship safety committee are of purely local application to conditions that exist upon the vessels where the suggestions originate. It is also true that the vast majority of the suggestions are impracticable. Yet who can gainsay the moral and practical value of having so large a number of men, comprising the actual working element aboard ship, constantly thinking in terms of safety, observing their own faults, criticising the improper methods of others and noting the conditions of fittings and equipment that may be conducive to accident? These men are unconsciously forming habits of thought and observation along these lines and are as unconsciously communicating the habit to their shipmates.

Some committees have furnished well executed sketches of appliances invented aboard ship for the prevention of personal injuries, the most meritorious of which included snub-

*Secretary, Lake Carriers' Association, Cleveland, O.

bing posts for mooring the lines of the mail boats in the Detroit River; a device for safeguarding the men at work on the hatch covers and a device for use in the firehold for the prevention of burns. Three different styles of landing pole have been invented by the men on shipboard and this device is now in rather general use.

SOME HAZARDS OF NAVIGATION

The hazard of personal injury aboard a bulk freighter is not nearly as great as on railroads or in mills. All dangerous places on deck, in cargo hold, dark hold, and around machinery are amply protected by guards and metal warning signs are freely posted in all necessary places. The percentage of unavoidable accidents aboard ship is small. The only one of serious nature likely to happen is when a cable may part and someone happens to be directly in its path, but cables seldom part. In the engine room, serious unavoidable injury can be sustained only when a part of the machinery lets go, and that seldom occurs. In the boiler room steam pipes may break, tubes, staybolts or other parts of the boiler may let go, and there may be back drive from the furnace, to cause serious injuries, but aside from these, personal injuries sustained aboard ship are usually avoidable; and probably 90 percent are due to pure carelessness, heedlessness of reiterated warnings or lapses of memory. Until recent years the greatest sources of fatal or serious injuries on deck have been falling through an open hatch into the cargo hold, entanglement of leg or arm in the bight of a cable, and in the engine department by having hands caught while feeling or oiling machinery.

The number of serious personal injuries has been greatly diminished. Of material significance is the fact that fatal injuries or total disablements sustained on deck have been largely curtailed. The extent to which fatal injuries sustained on deck have been diminished is shown by the record for the past ten years, divided into two periods, as follows:

FIVE YEAR PERIOD PRECEDING SHIP SAFETY COMMITTEES						
	Fell into Cargo Hold	Fell Overboard or from Docks	Fell from Ladders	Total Fatal Accidents	Total Fatal Accidents	Death Benefits
1913.....	5	7	3	15	15	\$1,400
1914.....	6	0	0	6	6	1,175
1915.....	2	9	1	13	13	1,100
1916.....	3	10	3	17	17	1,900
1917.....	5	7	0	13	13	1,150
Totals....	21	33	7	64	64	\$6,725

FIVE YEAR PERIOD OF SHIP SAFETY COMMITTEES						
	Fell into Cargo Hold	Fell Overboard or from Docks	Fell from Ladders	Total Fatal Accidents	Total Fatal Accidents	Death Benefits
1918.....	3	1	0	4	4	\$375
1919.....	2	2	1	5	5	700
1920.....	2	0	0	2	2	175
1921.....	2	0	1	3	3	250
1922.....	3	1	2	6	6	775
Totals....	12	4	4	22	22	\$2,375

A further comparison of the number of accidents between vessels having committees and those not entering into this plan, reveals that during the current year there have been on non-committee vessels 59 accidents and on committee boats but 45. The classification of these accidents is as follows:

	No Committee	Committee
Working on machinery.....	12	6
Cleaning fires and firehold work.....	14	6
Slipping and falling on deck, in rooms, etc.	9	6
Miscellaneous accidents and work.....	10	11
Handling hatches.....	4	5
Falling from ladders, staging, etc.....	4	4
Falling ore, coal, etc.....	0	2
Handling lines.....	6	3
Falling into hold.....	0	2
	59	45

WHAT SHIP SAFETY COMMITTEES HAVE ACCOMPLISHED

Many steamers now pass through a season of navigation without having sustained a single personal injury and in the fleet as a whole the number of serious injuries has been greatly diminished. Highly significant in this connection is the fact that in addition to the decreased number of personal injuries entailing expense to the vessel owners, the Protection and Indemnity insurance rate has remained stationary

through a number of years. A further important factor which should not be overlooked is to be found in the consistency with which the seamen stick to their boats in order to serve out the season on the ship safety committee. All vessel operators recognize the value of a steady-working seaman. There are now ship safety committees that go through the full season of navigation without change of personnel. The ship safety committees keenly sense their responsibilities and faithfully and conscientiously discharge their duties as they see them, both in committee or when performing their daily ship's work. At the start, they reluctantly served on the committees, now, they are eager to be members, many of them without regard for compensation. Moreover, they inspire others in the crew to be watchful of shipmates.

The outstanding feature that has come out of the ship safety committee is the increasingly large demand for lights—cluster lights forward and aft on deck to facilitate the safe taking off or putting on of hatches, lights to prevent falling into the cargo hold, lights to handle mooring cables on the dock, and lights to facilitate the landing of men from ship to dock; also more lights in dark places below deck and particularly electric lights in the paint and lamp room—instead of lanterns. A few years ago there was no such demand for additional illumination. The men took their chances in black nights and in dark places. It is noticeable, too, that the ship safety committees are no longer backward in setting forth conditions that are wrong on the boat, things that are in need of repair to insure safety.

Given to understand what the purpose of the ship safety committee is, mapping out the course they are to sail, with due cooperation from the office and officers and sustaining them in their recommendations for changes that will further insure safety whenever those changes are feasible, seamen will successfully conduct ship safety committees on all waters.

Six seasons of the ship safety committee have passed and progress is still being made. The Welfare Committee of the Lake Carriers' Association is more than satisfied with what has been achieved, and laying aside the humanitarian aspect and looking from the viewpoint of dollars and cents, it is believed that the vessel owners have been well compensated for their annual outlay in the maintenance of these committees.

Central Committee of American Marine Congress to Meet on April 10

FOR some time past the sub-committee of the central committee of the American Marine Congress, appointed to outline a plan for a permanent organization for the American Marine Congress, has been negotiating with the National Merchant Marine Association to the end that the two bodies might be consolidated. The National Merchant Marine Association, however, finally decided that such a consolidation would be unwise from its point of view. As a result, at a special meeting of the sub-committee of the central committee of the American Marine Congress, held in New York City on March 27, it was decided to request the chairman of the central committee to call a meeting of the whole committee for the purpose of reviewing the situation and determining the policy that the sub-committee shall follow in the future.

It was also voted to recommend to the central committee that the American Marine Congress participate actively in the dinner of the American Marine Association to be held at the Waldorf-Astoria Hotel, New York City, on May 15 next.

Subsequently Colonel E. A. Simmons, chairman of the central committee, issued a call for a meeting of the whole committee to be held at 30 Church street, New York City, at 2 P. M., Thursday, April 10.

British Shipowners Find Trade Facilities Act Harmful

The Artificial Stimulant Which It Provides for Shipbuilding Retards the Natural Growth of the Steamship Owners' Fleets

By W. H. Wendon

THE shipowners of the United Kingdom are now thoroughly alarmed at the wholehearted manner in which some of their number propose to avail themselves of the financial assistance afforded by the government under the title of the Trade Facilities Act. This measure has actually been in operation since 1921, but it is only within recent months that its influence on the future of the shipping trade has become really apparent. The guarantees provided by the government have, however, now reached an aggregate in pounds sterling when it becomes, in the opinion of leading owners, a matter of sufficient importance for grave consideration.

Without delving too deeply into the past, it is permissible to recall that, until fairly recently, the largest ship construction schemes under the Act were the ordering of a fleet of twenty-one motor vessels by Messrs. Andrew Weir and Company, managers of the Bank Line, Ltd., and the Royal Mail Steam Packet Company's contract for liners of a special type. Now, however, it is possible for practically any steamship owner in the kingdom to contract for a new boat, on condition that he himself finds approximately half the initial cost of building. And the situation is "aggravated"—the degree of aggravation depends, of course, on whether one is an owner or a builder—by the impression which prevails in usually well-informed quarters that it is only a matter of a short time before shipbuilders, quite apart from owners, will be placed in a position to lay down new vessels on "spec."; that is to say, on the off-chance of a buyer being found either during construction of the vessel or on completion, the State, of course, lending the builder a sum in the neighborhood of 50 percent of cost price. The sole object of these munificent loans, it may be worth while reiterating, is to provide employment for some of the many thousands of idle shipyard workers.

CHAMBER OF SHIPPING SOUNDS A WARNING

The question has come very prominently to the notice of the Chamber of Shipping of the United Kingdom, and was, in fact, dwelt on in no uncertain fashion at the annual meeting of the body. Sir Alan Anderson, who takes up the presidency of the chamber for the ensuing twelve months, made it clear, in his presidential address, that while owners sympathized with the anxieties of shipbuilders, masters and men, the best informed among them would agree that it was dangerous to apply this artificial stimulant to the shipbuilding trade in its present condition. He added:

If shipbuilders and shipowners are left to work out their own salvation according to the economic laws, the orders for ships will gradually increase, beginning with special steamers and extending as owners gain the impression that the time of lowest prices is going past.

But if shipowners, who have had such severe lessons of bad trade, due to an excess of ships in the world, gain the impression that their business is to be made a cockpit for non-economic government activities, it seems probable that every ship which is built before its time by government action will postpone a dozen or more other orders which would otherwise have been placed, if the government had kept quiet.

This view, coming, as it does, from the president of the leading shipowners' organization in the United Kingdom, may be taken as representing the views of the great majority of owners.

FOREIGN ORDERS FALLING OFF

Sir Frederick Lewis, chairman of Furness, Withy and Company, is another leading British owner who has misgivings in regard to these new boats. His point is that an improvement in shipbuilding usually follows a revival in the shipowning business, while, in the present instance, the reverse is taking place, owing partly to the government facilities above referred to. Incidentally, this authority mentions that, while we see slight signs of improvement in shipbuilding for British owners encouraged and helped by the government facilities, there is, on the other hand, a falling off in foreign orders, owing to high costs of manufacture.

COST OF THE BANK LINE MOTORSHIPS

Reference has been made in preceding paragraphs to the twenty-one motorships ordered by the Bank Line from Messrs. Harland and Wolff. The managers of this company have now secured the respectable sum of £1,800,000 from the public in 5 percent debenture stock, repayable 1928-1944. The issue is guaranteed as to principal and interest by the British Government under the provisions of the Trade Facilities Act, and it was scarcely surprising, therefore, that, despite the speculative nature of the project, the money was readily subscribed by the public. It is now revealed that the Bank Line, which had already ordered two Diesel boats, contracted in August, 1923, with Messrs. Harland and Wolff for the construction of a Diesel vessel 370 feet in length and of about 4,200 tons gross, to cost £85,000, and 18 Diesel vessels of about 420 feet in length, to cost £95,000 each, or a total of £1,795,000. It was stipulated that payment of all the 19 vessels was to be "cash on completion of each vessel," but that the usual five instalments are to be met during construction. As each of the 18 larger boats will carry about 9,000 tons deadweight, the cost works out at about £10 10s. per ton—a figure which, on the surface, is considerably in favor of the shipowners. There is, however, little, if any, comparison between this price and that which would have to be paid by an owner placing an order for a single vessel. In the latter event, a figure more nearly approaching £12 per ton is regarded as a closer estimate of the position.

SCRAPPING OF OLD SHIPS

While, as has been shown in the foregoing paragraphs, the leading topic is on the question of newly-built ships, there is, at the other end of the scale, pretty wide discussion on the continued existence of such a vast quantity of semi-efficient or non-efficient tonnage, mostly lying idle in the various ports and harbors of the world. In this regard, the following table, compiled from statistics issued by the Registrar General of Shipping and Seamen, and indicating the ages of British steamers sold to foreigners during the year 1923, is attracting a good deal of interest:

	No.	Tons gross
Built in 1920-23	11	17,387
" 1915-19	44	56,120
" 1910-14	24	71,252
" 1905-09	44	146,903
" 1900-04	56	212,695
" 1895-99	46	148,038
Prior to 1895	66	118,646
	291	771,041

The principal point in connection with the above is that, as will be obvious from the ages of the vessels, the majority of

them have been acquired by foreign interests for the sole purpose of scrapping them.

Incidentally, it may be pointed out that Sir Alan Anderson, in his Chamber of Shipping presidential address already touched on in another connection, made some rather pointed remarks on the scrapping question. After describing "surplus tonnage" as being one of the two main factors governing freights, he remarked that it was interesting to note that no less than 7,500,000 tons, or 12 percent, of the world's tonnage is over 25 years old, and that 4,500,000 tons, or over 7 percent, of the world's tonnage consists of ships built in the United States during the war, which are now laid up. And he added: "The United States Government has been advised that the greater part of these ships cannot ever engage in commerce with success." Sir Alan Anderson then drew the deduction that the returns of laid-up tonnage are not quite so formidable as they seem, and that, as individual shipowners in the United Kingdom have learned to their cost that, the sooner they break up an obsolete and unprofitable ship, the less money they lose, it might, without impropriety, be suggested to the owners of "this immense mass of obsolete or unsuitable tonnage," that "they would be doing not only the world but themselves a service, if they gave full employment to the shipbreakers."

EARNINGS OF THE SHIPPING COMPANIES

The termination of the strike of port workers in the United Kingdom (the men succeeded in securing an advance in wages of two shillings per day—a shilling as from the end of February and another shilling commencing June 1 next) has been followed by the compilation of statistics regarding the earnings of shipping companies. One of the principal contentions of the men who ceased work was that the shipping companies, by reason of their "large profits," could well afford to pay the £2,000,000 which it was estimated the additional wage of 2s. a day would involve. It is now maintained that, if certain figures as to earnings had been forthcoming at the time of the strike, the result might have been different from the employers' point of view. Be that as it may, however, the statistics are at all events of interest. For example, the results of the voyages during the year 1923 of the whole of the vessels owned by eight different companies have been summarized, and, in reproducing them below, it should be pointed out that the figures as to profit or loss have been arrived at before providing for management expenses, depreciation, interest, salaries, office rent or taxation. It will be noticed that, with vessels standing in the books at £10,403,191 after 5 percent per annum had been written off for depreciation, there is a net loss of £194,646, equal to 1.87 percent, and the figures are regarded as showing clearly how owners have been hit by the depression in the shipping industry. Subjoined are the figures:

SUMMARY OF STEAMERS' VOYAGE RESULTS, WITH PERCENTAGE OF LOSS OR PROFIT ON CAPITAL EMPLOYED.

Company	No. of voyages	Profit or loss £	Capital employed based on original cost, less 5% p.a. £	Percentage of profit or loss on capital
"A"	74	+ 13,456	623,918	+ 2.16
"B"	76	— 33,847	3,711,128	— .91
"C"	18	— 1,897	381,000	— .49
"D"	75	— 38,770	2,048,276	— 1.89
"E"	16	— 35,157	941,099	— 3.73
"F"	37	— 48,301	1,215,131	— 3.97
"G"	19	— 17,370	728,843	— 2.38
"H"	22	— 32,760	753,796	— 4.34
		208,102		
		less 13,456		
	337	— 194,646	£10,403,191	— 1.87

The dock strike, with its burden of additional costs, came as a blow to those who were making great efforts to keep port and harbor charges to the lowest figures possible. Now, however, Sir William Raeburn, who, in addition to being a shipowner of many years' standing, is head of the Clyde Navigation Trust, which, as its name implies, is responsible

for the working of the great River Clyde network of docks and harbors, states that the increased wages to the dockers will mean an extra cost of £40,000 per annum so far as the port of Glasgow is concerned. Sir Frederick Lewis and other leading owners have been urging that port charges should be still further reduced, but Sir William Raeburn says that he can give owners no hope of any reduction of port expenses in the United Kingdom. Moreover, he considers that port charges will never be as low as those on the Continent.

What the Y. M. C. A. is Doing for Merchant Seamen

(Continued from page 208)

ment service is available to assist them in obtaining a berth: if their papers need adjusting or passports are necessary, the "Y" facilities matters for them.

Although seamen need a place while ashore at home ports where the atmosphere is friendly and their rather simple wants can be provided for, in foreign lands, where in most cases even the language is unfamiliar, it is almost essential that they be provided with some means of obtaining assistance when they are in trouble. The many ways in which this can be accomplished constitute a real duty for their countrymen to perform insofar as they are able. In addition, the good which those who have assumed this responsibility are accomplishing not only deserves the support but should have it accorded to them by the operators most vitally interested in maintaining the personnel of their ships at a high state of efficiency.

WORK OF THE FOREIGN BRANCHES

Not only do the foreign branches attempt to look after the necessities of life while the men are ashore, of caring for them when they are sick or stranded, of straightening out any tangles in their personal affairs that can be straightened, of finding employment for them, but they also provide entertainment and recreation during their stay in port. Shopping trips, sight-seeing tours, theatre parties, sports, good reading matter and a thousand and one other means are provided to make their stay of interest.

Incidentally, the branches are called into service by tourists who, hearing that a "Y" is in existence at a given place, bring their travel difficulties to the secretary for solution—passports to be viséd, money changed, travel information dispensed, advice on reservations and the like.

So valuable has the work of the organization become in foreign ports that when the American fleet recently put into Villefranche on its Mediterranean cruise the branch of the seamen's "Y" at Le Havre was requested to open temporary quarters at the port of Villefranche where it could serve the blue jackets during their stay in France. This was done and the efforts of the "Y" workers won the gratitude of the men and the commendation of officers of the fleet.

SAFETY EDUCATION.—For the purpose of making the results of the good work done in a number of cities more widely available and to bring before schools throughout the country the fact that safety education has a claim upon them that cannot be disregarded, the Education Section of the National Safety Council has recently published a book entitled "An Introduction to Safety Education." The book is intended for the teacher rather than the pupil.

NATIONAL FOREIGN TRADE CONVENTION.—The National Foreign Trade Convention will be held at Boston, June 4, 5 and 6. The central theme of the convention will be "Our Need for Wider Markets." The program will include a discussion of "Merchant Marine Problems."

Securing Fuel Economy at Sea

Steam and Water Leaks, Poor Insulation, Waste of Exhaust Steam Cause In- efficiencies in Steamship Operation

By Commander H. C. Dinger, U. S. N.*

FUEL is one of the largest items of expense in operating a vessel. The cost of fuel appears to be continually on the increase and, therefore, any means for securing economy in fuel consumption has a most vital effect on successful operation. Economy is, of course, largely dependent on the design of the machinery, but the maintenance and operation of the plant is often a bigger factor than the design. Competition in design features serves, as a rule, to keep the design fairly well abreast of the times. The efficiency of operation is a variable depending upon the operating personnel and operating conditions.

The input into a machinery plant is the fuel that is burned and the output is the power applied to the propeller. It is a problem of converting as many as possible of the heat units of the fuel into useful work. The problem of the operating personnel is to avoid the waste or loss of any possible heat units. These sources of loss are manifold, and at every operation in the cycle there is some loss, a portion of which is avoidable. The amount of the loss is often not appreciated because it is not tangible and in many cases not definitely measurable. Yet many an installation can have its economic efficiency improved 25 percent and some 50 percent by improvement in care and operation. Nine-tenths pound of oil or 1.3 pounds of coal per shaft horsepower delivered are results that can be obtained practically on up-to-date installations in good condition.

BOILER CONDITIONS

Combustion is 100 percent efficient when all the fuel is completely burned and only enough air to support this combustion is supplied. This ideal is never secured because practical conditions prevent it. However, the aim of the operator is to approach this ideal result as closely as possible.

As a rule, more air than necessary is supplied. The extra air, not needed for combustion, is heated to the temperature of the furnace gases and leaves the boiler at uptake temperature. Assuming an uptake temperature of 600 degrees F., the excess air has been heated about 500 degrees—representing waste. On many boilers two or even three times the air necessary for combustion is admitted. It is practicable to operate oil burning boilers with only 20 percent excess air and coal burning boilers with about 40 percent.

The amount of excess air is indicated by flue gas analysis. There are other practical means, however, of determining whether conditions are right, particularly with oil burning. Heavy black smoke indicates insufficient air. White smoke or no smoke indicates too much air. A light brown smoke indicates approximately correct conditions.

Air entering the boiler through a leaky casing is even more injurious than excess air coming in through the furnace and for this reason every effort should be made to keep the boiler casings air tight.

Efficient firing is most important. The oil burners must be clean and adjusted to give an efficient spray. The oil should be heated to the proper point to give the viscosity best suited for that particular oil. With coal, the expertness of the fireman in keeping an even clean fire and avoiding ash pit losses are a big part of the game. With coal, proper damper

control is also most important since this is the most direct way of regulating the air.

Next to avoiding an excess of air and efficiency in firing comes the matter of clean heating surfaces. Any deposit on the heating surface, either on the water side or the fire side, is a cause of loss of efficiency. If the heating surface is dirty, the heat will not be conducted through the metal as rapidly as it should, uptake temperatures will increase and more heat goes up the stack unused. A low uptake temperature is an indication of an efficient boiler and of a clean boiler. It is also an indication that there is no secondary combustion. Therefore, the uptake thermometer should be watched, almost as much as the steam gage.

With Scotch boilers, working on pressures of 200 to 250 pounds, the uptake temperature should not be more than 500 degrees F. at normal full power. With watertube boilers of the express type it may be somewhat higher, but should not exceed 600 degrees F. Each engineer should know the uptake temperature of his boilers when in good condition, and properly fired. If uptake temperatures are above this there is something wrong with the boiler or with the fireman.

FACTORS GOVERNING BOILER EFFICIENCY

Among minor matters affecting boiler efficiency the following may be mentioned:

- (a) Maintain a constant even feed and do not keep the water level too high or too low.
- (b) Keep the boiler tight, all leakage is a loss.
- (c) Keep the boiler well lagged and the lagging in good repair. Do not allow it to become water soaked.
- (d) Make sure that your bottom blows are tight and do not use them too much.

If combustion is as nearly perfect as possible and the boiler is properly clothed, with heating surfaces clean, the avoidable heat losses are those that go up the smoke pipe. The uptake thermometer will give you a gage of these losses. Every 60 degrees reduction in uptake temperature indicates an increase of about 1 percent in boiler efficiency. Therefore, if the uptake temperature is brought down from say 800 degrees F. to 600 degrees F., there will be a gain in boiler efficiency of about 3 percent.

How many marine boilers are without uptake thermometers? How many engineers read them regularly when they are fitted?

Air heating systems such as Howden's extract some of the heat from the waste furnace gases and utilize it for heating the air of combustion. This is a source of economy sufficient to justify the rather costly and elaborate air heater that is provided. The gain due to air heating is not over a few percent, yet it pays to put in the elaborate air heater. Careful watch of uptake temperature will give greater gain and no apparatus except an uptake thermometer is required.

DRY STEAM

Wet steam is caused by boilers priming or by a bad steam pipe lead. This is a cause for lack of economy since wet steam will not give you the full economic results.

The following may enable you to get drier steam:

- (a) Lowering water level in boilers.
- (b) Putting a proper dry pipe in the boiler or a separator in the steam line.

*League Island Navy Yard, Philadelphia, Pa.

- (c) Clean your boiler water of salt or sediment.
- (d) Close down slightly on the boiler stop so as to wire draw the steam a little.
- (e) Close down on the throttles a bit, you may be taking the steam away too quickly.
- (f) See that you have proper clothing and lagging on your main steam pipe and connections.

Moist steam is responsible for more loss in economy than most of us realize. As a rule nobody minds it until there is danger of water hammer. Reading the thermometer on the main steam line will at once give an indication whether steam is dry or not. If this temperature is below normal for the pressure carried, it indicates moist steam. A calorimeter will, of course, give you definite data, but this instrument is not ordinarily fitted, although on a large plant it would easily pay for itself.

Again we see where temperature comes in and where reading a thermometer may be useful. If thermometers are not fitted, they should be, they are cheaper than fuel.

If a thermometer is fitted, the engineer can get a line on whether his steam is dry or otherwise. The thermometer should show a temperature within a few degrees of the temperature corresponding to the pressure carried, thus—

Gage Pressure	150 pounds—366 degrees temperature
Gage Pressure	160 pounds—371 degrees temperature
Gage Pressure	170 pounds—375 degrees temperature
Gage Pressure	180 pounds—380 degrees temperature
Gage Pressure	190 pounds—384 degrees temperature
Gage Pressure	200 pounds—388 degrees temperature
Gage Pressure	210 pounds—392 degrees temperature
Gage Pressure	220 pounds—396 degrees temperature
Gage Pressure	230 pounds—399 degrees temperature
Gage Pressure	240 pounds—403 degrees temperature
Gage Pressure	250 pounds—406 degrees temperature

A throttling calorimeter is not an expensive instrument and is easily operated. It can readily be fitted and the calculation for securing percentage of moisture is not difficult. A set of steam tables is required to obtain the data for the problem. Any engineer can quickly learn how to take calorimeter readings and make the calculations. Then the engineer can determine how dry his steam is and action to reduce moisture in the steam can be taken. Ordinarily steam should not contain over 2 percent moisture. By using superheaters losses due to moist steam are avoided.

STEAM AND WATER LEAKAGE

Leakage of steam and water is responsible for considerable loss. All steam joints in the piping system should always be kept tight. This can be done if proper flanges and packing are used. Stuffing boxes on valve stems and on piston rings of auxiliary engines and pumps account for a large part of steam leakage. If these stuffing boxes are fitted with proper type of metallic packing and the rods kept free from rust and slightly lubricated, practically all of this leakage can be stopped. Properly fitted metallic packing is the only suitable packing for steam piston rods of any size. Soft packing may be used in emergency, but it is not good practice for continuous service.

There are many leaks that are not ordinarily noticed, such as leaky bottom and surface blow valves on boilers. Leaking receiver or auxiliary throttle valves on main engines or auxiliaries may account for many hidden losses.

The loss by leakage may easily amount to as much as 10 percent of the total steam used and probably is as much as 4 percent on many installations that are considered fairly tight.

Leakage cannot very well be measured, but by constant search, watchfulness and examination it can be kept at a very low point.

USE OF AUXILIARY EXHAUST

In the first place no more auxiliary machinery should be operated than is necessary. If one pump will do the trick, do not operate two. Use all the auxiliary exhaust usefully

and do not put any directly into the condenser if it can be avoided. Auxiliary exhaust can be used for (1) feed heating, (2) distilling, (3) ship's heating, (4) gland steam for turbines, (5) in lower stages of turbines or low pressure receivers of engines.

The greatest returns are obtained by that used for feed heating, but in many cases there is more auxiliary exhaust than that required for this purpose. The next best return is to use it for distilling. This applies particularly in port. Excess above this can be used in main engines if proper connections therefor are fitted. There is as much available heat in steam expanded from atmospheric pressure to 28 inches of vacuum as there is in steam expanded from 250 pounds gage to atmospheric pressure. Steam at atmospheric pressure still has a good kick left in it. It can be used if we go about it right.

INTELLIGENT USE OF DRAINS ON STEAM PIPING AND RECEIVERS

Drains are fitted to get rid of condensed water, but are not supposed to pass live steam. They should be open when water is present and closed when steam appears. Some lazy people keep certain ones open all the time to make sure that they are open when the water comes. This practice is poor economy. Get acquainted with the habits of the machinery and see that drains are opened only when they are needed. These drains should be piped up to feed tank if possible so that the fresh water and heat that it contains is not lost.

VACUUM

Next to feed heating, this is the biggest thing to watch. There is really only one answer to the question, "What is the best vacuum to carry?" and that is the highest you can carry without wrecking your equipment. The principal enemy of a good vacuum is air leakage. As a rule, if you can stop the air leakage, the biggest part of the battle is won. Air leaks in at any joint below atmospheric pressure. Therefore, watch all exhaust joints, especially in the low pressure drainage system, all stuffing boxes on low pressure cylinders, air pumps, etc. See that astern throttles for turbines are tightly closed. They are often left partly open so that a backing bell can be quickly answered. All condenser connections should be tested frequently. Steam and water seals can be employed in many places to keep out air.

The condensing surface must be clean on both sides. Oil deposit on the steam side and sand, ashes, sea weed, etc., on the water side may render these surfaces inefficient. The air pump must be in proper condition. If a bucket type, the valves must be tight and properly adjusted and the bucket reasonably tight. If a jet is used the nozzles cannot be materially worn.

If you do not get 28 inches vacuum with an overboard discharge temperature of 100 degrees F., something is wrong. People who are satisfied with anything less than 28 inches are burning fuel unnecessarily. When your vacuum drops, keep searching till you find the cause. You will be well rewarded.

MEASURING THE VACUUM

The vacuum gages ordinarily placed on vessels are not very reliable when indicating high vacua. A very good check on the vacuum can be obtained by having a thermometer on the engine exhaust trunk. The temperature of the exhaust should correspond quite closely with the steam table temperature of corresponding pressure actually present and, by using the thermometer reading, a much more reliable indication of the actual exhaust pressure can be obtained.

The temperature of the exhaust should not be very much higher than the temperature of the air pump discharge or the overboard discharge. For best conditions, with 28 inches vacuum the exhaust temperature should be 100 degrees F.,

air pump discharge 95 degrees and overboard discharge about 90 degrees. If the temperature of the exhaust can be brought lower without materially lowering the temperature of the air pump discharge, so much the better.

Some engineers have the idea that a vacuum of 29 inches is a laboratory proposition. With circulating water below 70 degrees and a well designed air pump and condenser, a vacuum within one inch of the barometer can be readily maintained if air leakage is stopped. There are probably several hundred places where air may leak in. Get them all stopped.

FEED HEATING

Feed heaters are now generally installed but are not always properly operated. If a back pressure of 25 pounds absolute is used, which corresponds to a steam temperature of 240 degrees F., the resulting feed temperature should be about 230 degrees F. The principal causes for low feed temperature are the following:

(a) Heater not properly drained. Heater becomes filled with water and heating surface becomes inoperative.

(b) Heater allowed to become air bound. If the air which accumulates above the surface of the water is blown out, proper results can again be obtained. This air, however, is constantly accumulating and must be blown out periodically, at least every hour.

(c) Fluctuating pressure on auxiliary exhaust. If the pressure drops below atmospheric, the heater will not drain properly.

(d) Drain open too wide, permitting steam to blow through. All the exhaust steam sent to the heater should be condensed there and only allowed to leave the heater as water.

(e) Dirty heating surfaces or tubes obstructed—heaters to be efficient must be clean both on the steam and on the water side.

In practice, every 10 degrees higher feed temperature means an increase of 1 percent in fuel economy. A temperature of 200 degrees F. should be obtained even at full power with 5 to 10 pounds back pressure. If this is not secured there is something wrong with the feed heater or with its operation. Again the thermometer is a handy guide and assistant in getting results.

GENERAL SUMMARY

A very good marine boiler, efficiently operated, will give an efficiency of about 80 percent. By poor firing, dirty heating surfaces and leaky boiler casing the efficiency may drop to 50 percent without anything very bad being apparent. By watching the smoke pipe, the furnace and the uptake thermometer, and seeing that boilers are regularly cleaned, an approximation to 80 percent efficiency can be maintained. Leakage and radiation losses in the machinery plant of a vessel in fairly good condition amount to 5 percent of the steam generated. This loss, however, can be easily doubled or trebled by permitting leaks to accumulate and by permitting clothing and lagging to deteriorate, become water soaked or be removed.

Proper feed heating secures a gain in economy of about 10 percent, poor feed heating may not give more than 2 percent or 3 percent.

The difference in steam consumption between 27 inches vacuum and 29 inches vacuum for a plant having an initial steam pressure of 200 pounds is likely to be something over 12 percent. This may sound phony, but try it.

On an efficient turbo-reduction gear layout a water consumption of 14 pounds of water per shaft horsepower for all purposes should be secured continuously in practice.

If an evaporation of 15 pounds of water per pound of oil is obtained, the pounds of oil per horsepower should be 0.93. This should correspond to about 1.35 pounds of coal per horsepower. How many of our main plants approach this performance? The actual results in most cases are not within

30 percent of this result. No modern marine installation should consume, on an average, more than 1.1 pounds of oil per horsepower hour for all purposes. If this result is not secured, either it is not efficiently operated or is not in efficient condition. The matter needs looking into. Perhaps the cause for conditions is insufficient operating personnel to permit the cleaning and overhauling to be accomplished. Perhaps it is a non-realization on the part of the operating personnel of the importance of operating the plant economically. It is just about as easy to operate a plant economically as uneconomically and it saves repairs as well as fuel.

The question of fuel economy revolves itself mainly around the proposition of not allowing any heat units to get away and not allowing air or salt water to get into the system. It is not necessary to be thoroughly familiar with all the theory of thermodynamics to stop heat losses or air leakage. The unavoidable losses are found in leaks, in the waste funnel gases and in the overboard discharge.

The temperature of exhaust steam and of uptake gases should be kept at the working minimum. If one is below 110 degrees F., and the other below 500 degrees, things are in pretty fair shape.

Ice Fields on the Great Lakes

THE United States weather bureau and the Canadian meteorological survey has just made public its first report on the condition of the Great Lakes. In the Lake Superior harbor ice at Duluth is 25 inches thick, or two inches below the average for this time of the year. The lake ice fields extend about 15 miles along the north and south shores.

At Two Harbors no ice fields are reported between there and Grand Marais, Minn., but from Port Arthur to Thunder Bay solid ice prevails.

Extensive ice fields are off Keweenaw Point and Marquette. At Sault Ste. Marie the ice is 18 inches thick.

Ice on Lake Michigan ranges from 18 to 20 inches in thickness, with a covering of half a foot of snow in some places. Solid ice is reported at Sturgeon Bay. No extensive ice fields are reported along the west coast except off Chicago, where the ice extends beyond vision.

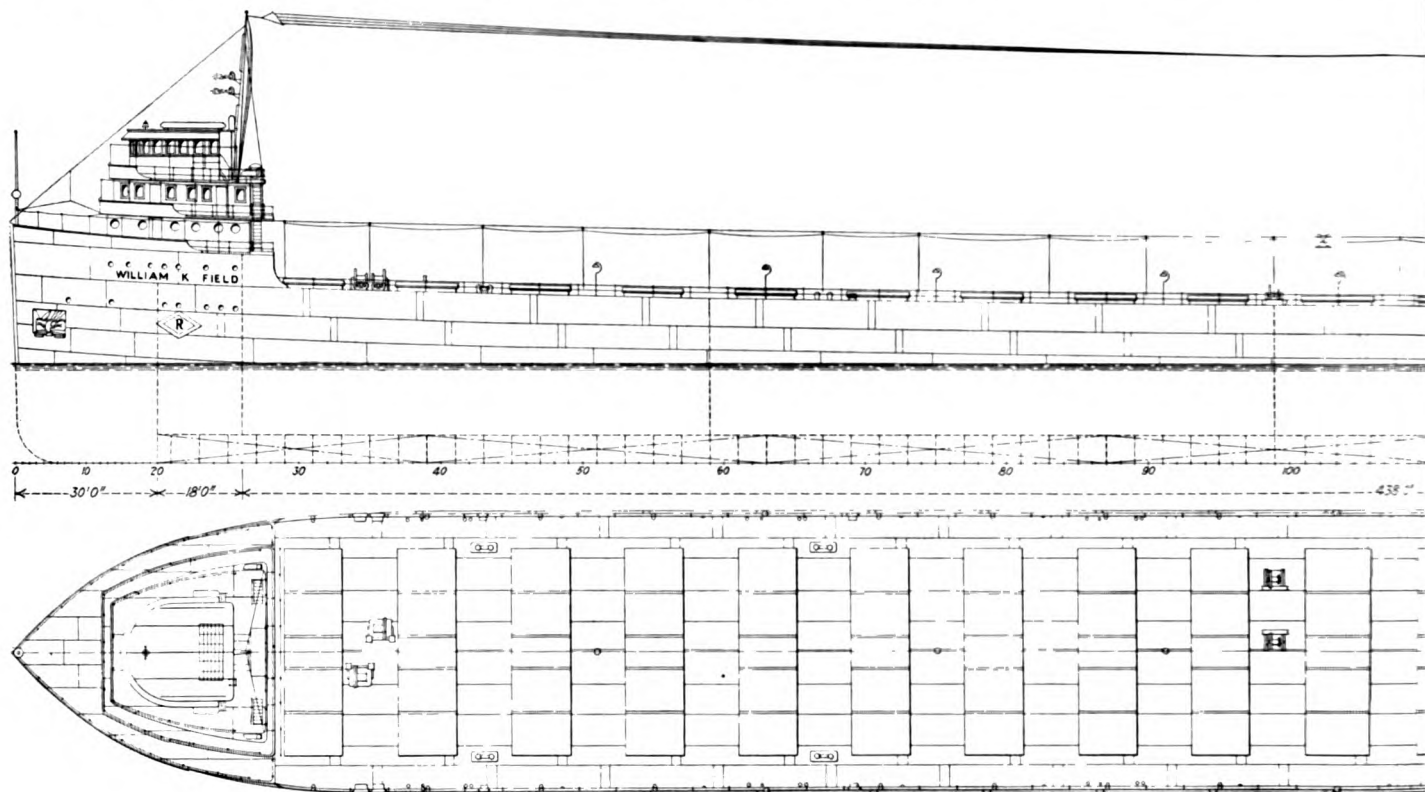
The ice fields in the southern and northern part of Lake Huron are solid and along the east shore extend beyond vision. The St. Clair river is solid to Lake St. Clair. The Detroit river is open and free of ice almost down to Fighting Island.

In Lake Erie ice fields extend beyond vision along the south shore from Toledo east to Buffalo and the ice is heavily windrowed in some places. Ice at Toledo is half a foot thick and from 16 to 18 inches at Cleveland and Conneaut and 15 inches at Buffalo. No ice fields are reported over the eastern part of Lake Ontario but the western part of the lake is well covered. Toronto Bay is frozen to the depth of 18 inches.

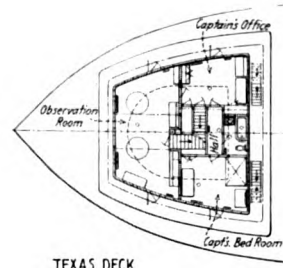
Another Inland Hull Loss

IT is believed that a claim of \$200,000 will result from the loss of a dredge of the Morris and Cummings Dredging Company in the inner harbor of Providence, R. I., a few weeks ago. This adds one more to the very considerable total of losses that has occurred to inland hulls during the last two years. Inland hull business has been far from profitable and the market for this class of risk is gradually growing smaller. The loss of this particular dredge is serious because the underwriters are inclined to the belief that such vessels are better than the ordinary inland hull risk. It is said lack of floating fire apparatus in the harbor made the loss possible, although five bay tugs did what they could to extinguish the flames with short hose lines.

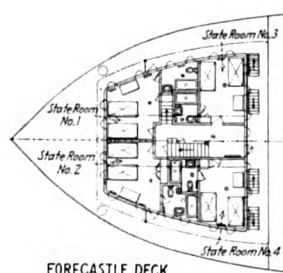
Toledo Shipbuilding Company Completes Modern Bulk



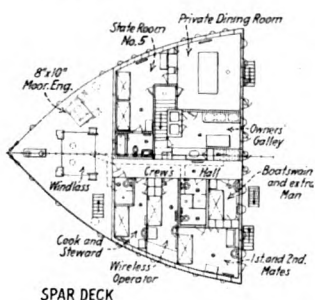
General Arrangement Plans of



TEXAS DECK



FORECASTLE DECK



SPAR DECK

ALTHOUGH the large bulk freighters built on the Great Lakes conform in general to a design that has proved in practice most efficient for handling ore, coal and grain, nevertheless this design is by no means standardized and as new vessels are brought out improvements in structural and machinery details and in the general arrangement of the vessel are continually being made to secure greater capacity, higher speeds and better efficiency. An example of this is found in the steamship *William K. Field*, of 8,000 gross tons, just completed by the Toledo Shipbuilding Company, Toledo, Ohio, for the Reiss Steamship Company, Cleveland, Ohio.

In accordance with usual lake practice, the vessel is of the single deck type built on the arch and web frame system. Her dimensions are: length overall, 604 feet; length between perpendiculars, 580 feet; molded beam, 60 feet, and molded depth, 32 feet. The spar deck is continuous from stem to stern and is fitted with 18 cargo hatches spaced 24 feet between centers.

A continuous double bottom extending to the sides of the

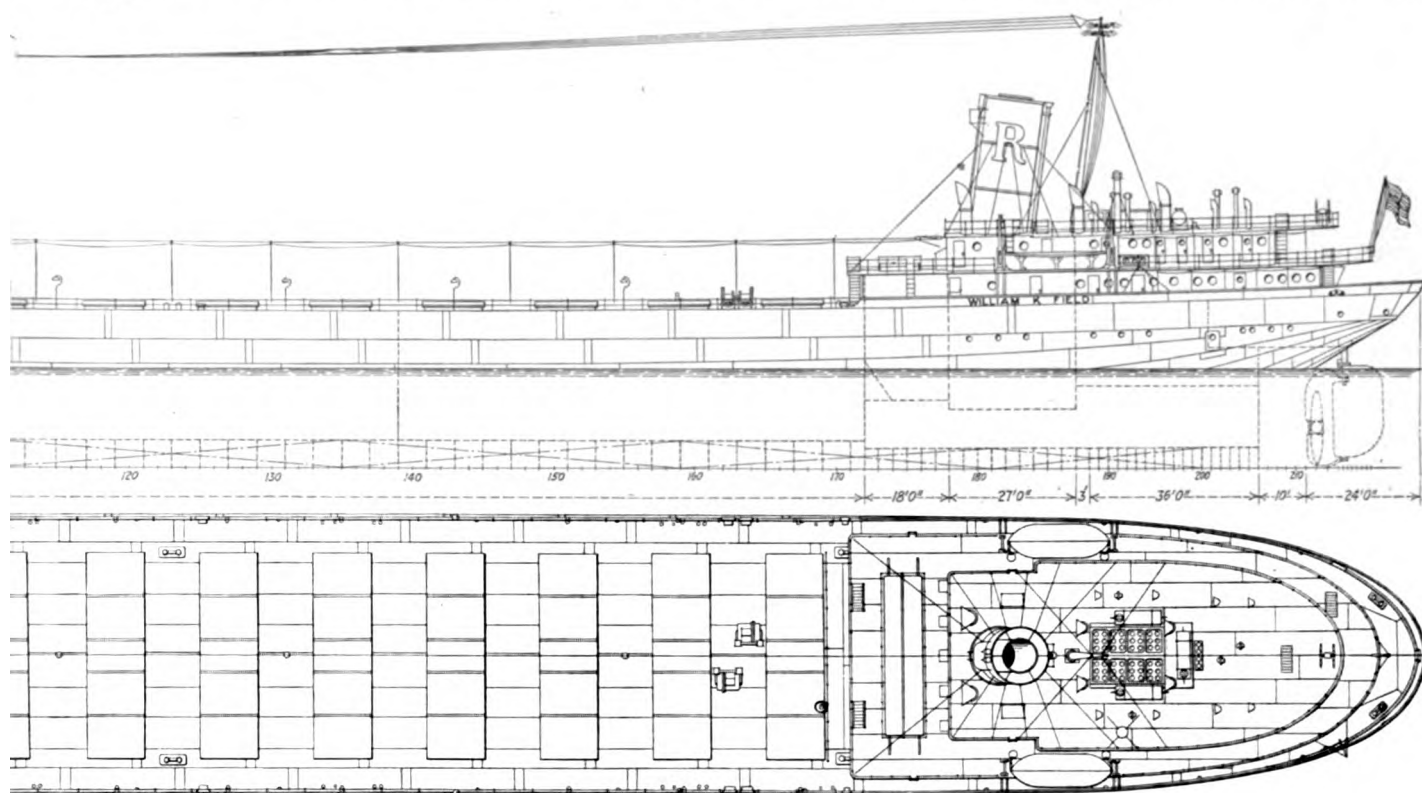
vessel is fitted from the forward collision bulkhead to the engine room well. It is divided into 8 watertight compartments in a fore-and-aft direction and also transversely by a watertight center keelson. Side hopper tanks extending from the tank top to the under side of the spar deck are fitted continuously from the dark hold bulkhead forward to the after coal bunker bulkhead. These tanks are also divided into 8 watertight compartments. The water ballast capacity of the double bottom tanks is 4,437 tons, of the side tanks 3,118 tons and of the fore and aft peak tanks 588 tons.

The main scantlings of the hull are shown on the mid-ship section reproduced on page 220. The frames in the body of the vessel are spaced 36 inches apart and in the peaks and machinery space, 24 inches apart. Deep plate floors are



Ready for Launching

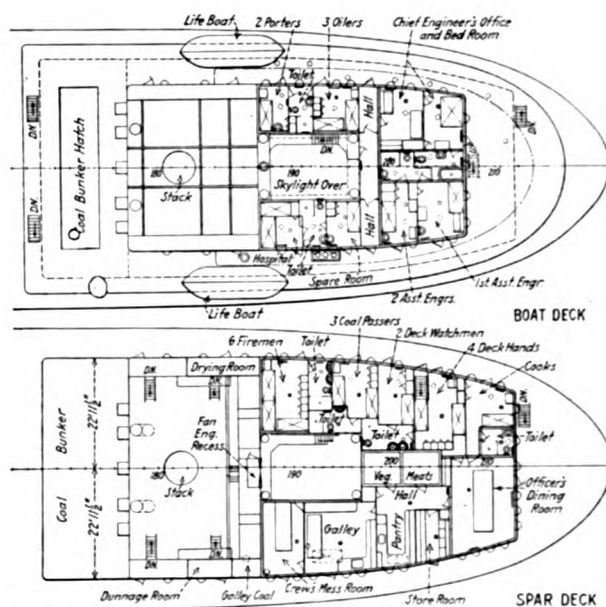
Freighter William K. Field for Reiss Steamship Company



Low Bulk Freighter William K. Field

spaced 6 feet apart while the plate web frames are spaced 12 feet apart and the arch girders between each hatchway, 24 feet apart. The watertight center keelson, 66 inches deep, is continuous from stem to stern. On either side, spaced 6 feet apart, are 4 intercostal side keelsons.

The collision bulkhead, located 30 feet abaft the stem and extending from the keel to the spar deck, is watertight throughout. The dark hold bulkhead, located 18 feet abaft the collision bulkhead and extending from the tank top to the spar deck is watertight only to the main deck. The cargo space is sub-divided by 3 screen bulkheads of staggered type construction, details of which are shown on page 221. The stiffeners of the screen bulkheads are lugged to the tank top with an 18-inch plate fitted across the tank top and on the face of the stiffeners, the spaces being filled with cement.



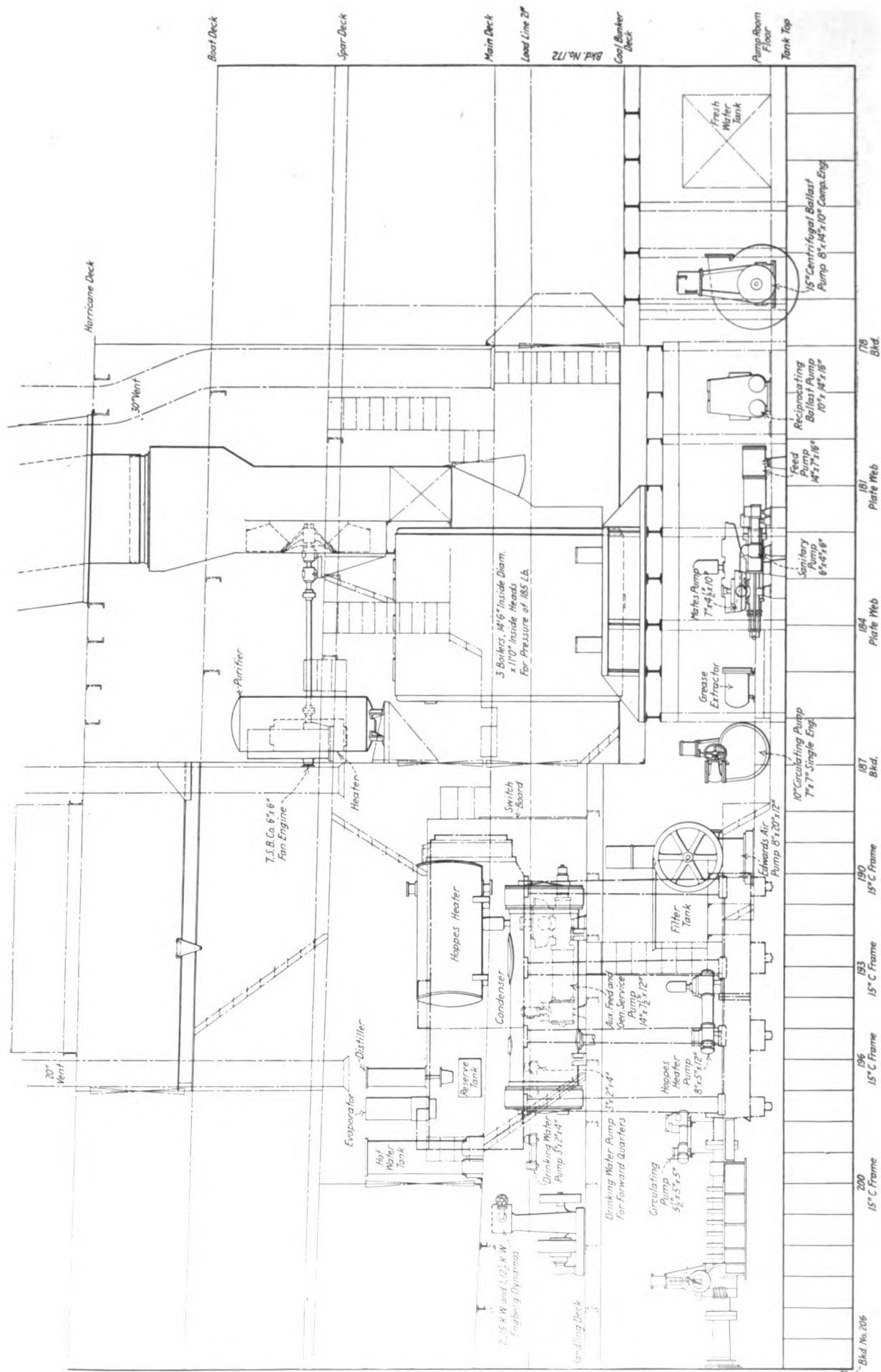
ACCOMMODATIONS

Forward there is a raised forecastle with a double Texas and pilot house above. The upper Texas contains the owner's sitting or observation room and the captain's office, bedroom and bath. The lower Texas on the forecastle deck contains 4 passenger's staterooms each with a separate bath while below on the spar deck is a fifth stateroom, a private dining room, owner's galley and accommodations for the deck or navigating crew. Contrary to the usual lake practice, the officers' dining room is located in the after deck house, the space forward being given over to the passenger accommodations.

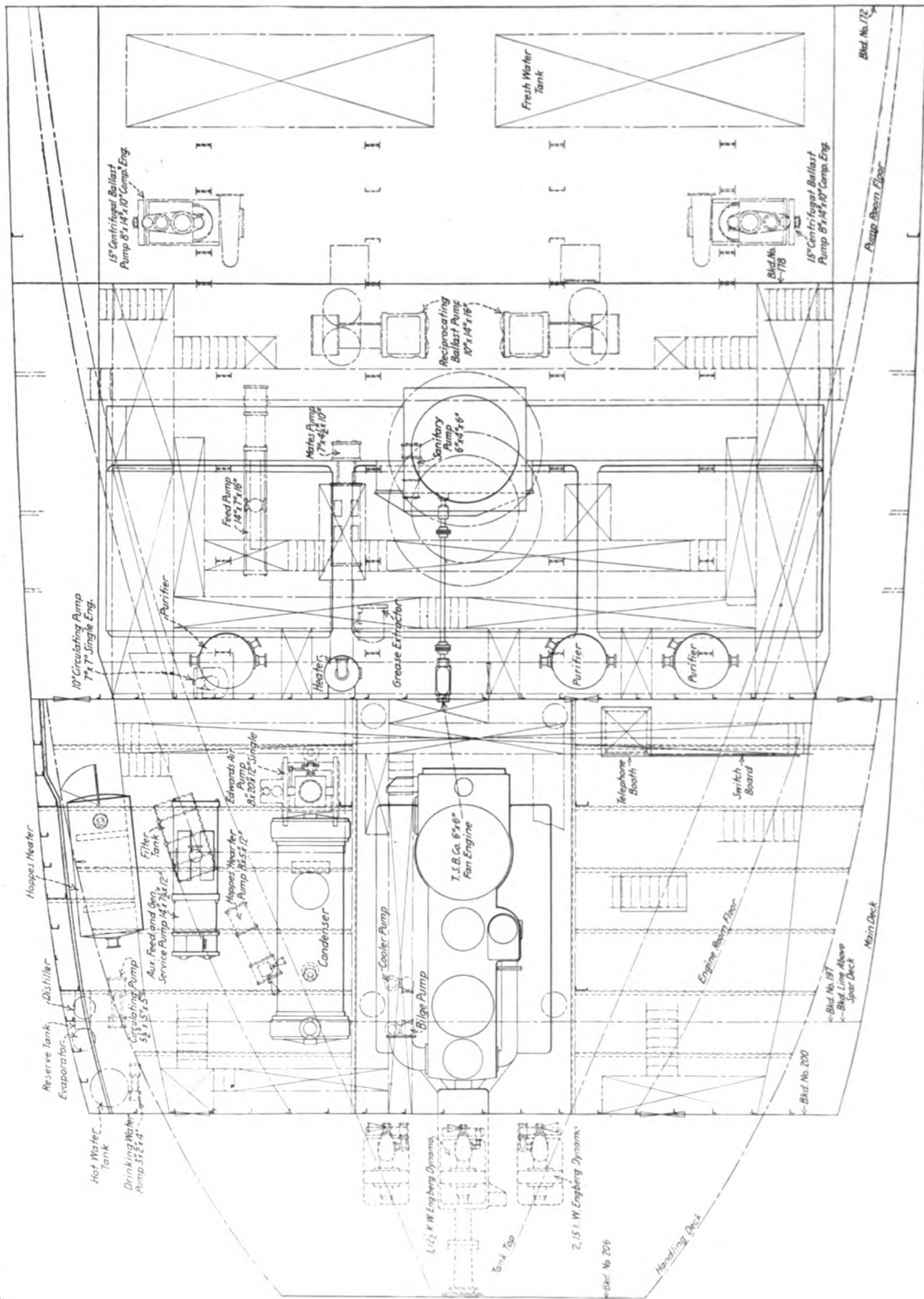
The propelling machinery is located aft with a steel deck house on the spar deck surrounding the machinery and boiler



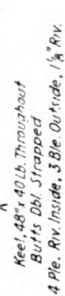
Taking Her First Dip



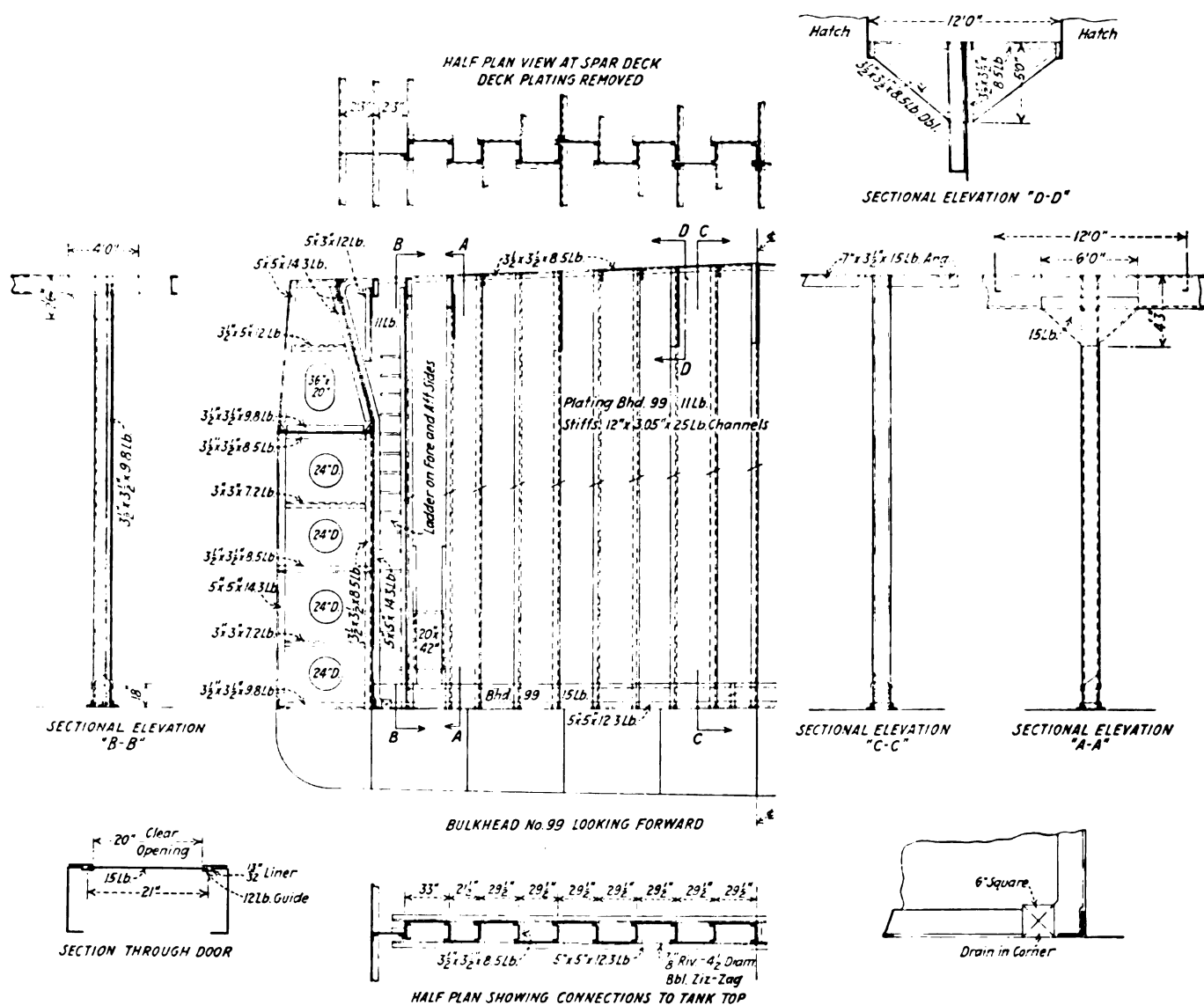
S. S. William K. Field : Longitudinal Section Through Machinery Space



S. S. William K. Field: Plan of Machinery Space



Midship Section of S. S. William K. Field



space. Superimposed upon this house is a steel house for the accommodation of the engineers. The lower house aft contains accommodations for the firemen, coal passers and cooks, together with the officers' dining room, galley and crew's mess.

PROPELLING MACHINERY

Propulsion of the vessel is by a single screw driven by a triple expansion surface condensing engine supplied with steam from 3 Scotch boilers. The use of a surface condenser is something of an innovation on lake freighters and another novel feature is found in the arrangement of the boilers and coal bunker which are located on a raised deck immediately forward of the engine room, the space below the boiler deck being used for a pump room. The raised boiler deck is supported by 4 rows of 12-inch by 25-pound channels, doubled and fitted on every beam.

Steam is furnished at a pressure of 185 pounds per square inch by 3 Scotch boilers, each fitted with two exceptionally large Morison corrugated furnaces. These furnaces have an inside diameter of 54 inches and lead to separate combustion chambers. The heating surface of each boiler is distributed as follows: Tubes, 2,268 square feet; combustion chambers, 190 square feet; furnaces, 116 square feet; total, 2,574 square feet. The grate area is 49.5 square feet, making a ratio of heating surface to grate area of 52 to 1. The boilers are

fitted with Foster superheaters and a complete installation of Ellis & Eaves system of induced draft, consisting of an 8-foot diameter fan at the base of the stack driven by a direct connected double cylinder engine. Three vertical Learmouth purifiers, 42 inches inside diameter by 8 feet high, are located on brackets above the boilers on the after boiler room bulkhead.

The main engine is of the vertical triple expansion type with cylinders 25½ inches, 41 inches and 67 inches in diameter by 42 inches stroke, designed to develop 2,300 indicated horsepower at 86 revolutions per minute. The crank shaft, crank pins and thrust shaft are 12¾ inches diameter and the outboard shaft is 14 9/16 inches in diameter in the body and 14¾ inches diameter in the bearing. The propeller is of the 4-blade sectional type, 15 feet 3 inches diameter and 14 feet pitch with a total expanded area of about 86 square feet.

The auxiliaries include the following:

- Two 15-inch Morris Machine Works centrifugal ballast pumps.
- Two Dean horizontal duplex ballast pumps 10 inches by 14 inches by 16 inches.
- One Dean horizontal duplex general service pump 14 inches by 7½ inches by 12 inches.
- One Dean horizontal simplex feed pump 14 inches by 7 inches by 16 inches.
- One Dean horizontal duplex mate's pump 7 inches by 4½ inches by 10 inches.
- One Dean horizontal duplex sanitary pump 6 inches by 4 inches by 6 inches.

River Steamers Used In Coast Service

General Details of Two United States War Department 150-Foot River Type Steamers for Harbor Work

By C. H. Handy

TWO river steamers of unusual design for western river practice have recently been completed by The Charles Ward Engineering Works, of Charleston, W. Va., from designs prepared by Cox and Stevens, naval architects, of New York City. The original contract called for three vessels, sister ships, designed as harbor vessels for the War Department Army Transport Service, for the transport of army officers and troops and quartermaster supplies between the mainland and island forts.

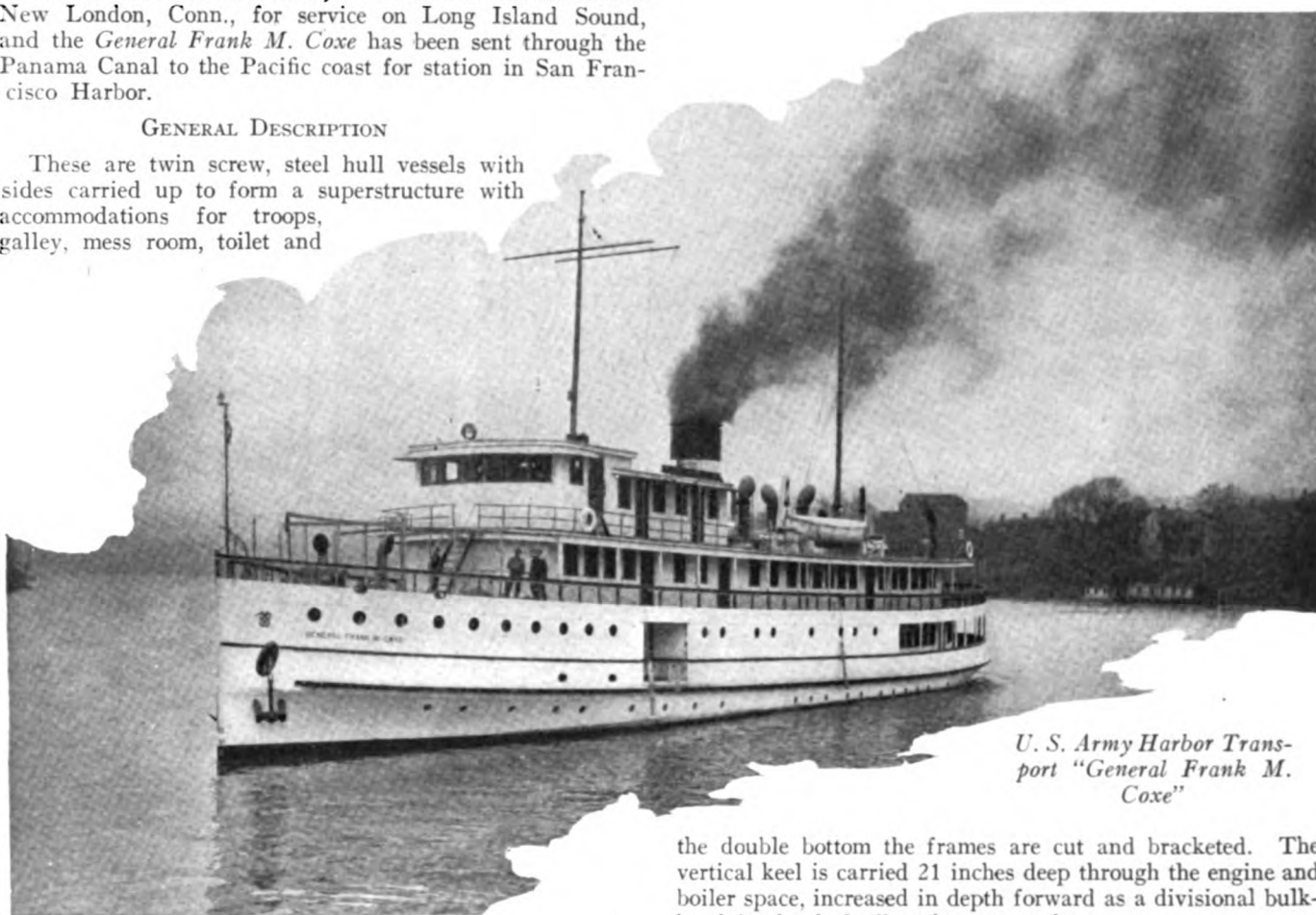
The *General John McD. Hyde* has now been delivered at New London, Conn., for service on Long Island Sound, and the *General Frank M. Coxe* has been sent through the Panama Canal to the Pacific coast for station in San Francisco Harbor.

GENERAL DESCRIPTION

These are twin screw, steel hull vessels with sides carried up to form a superstructure with accommodations for troops, galley, mess room, toilet and

which is scarphed to the vertical plate keel. The stern post is a steel casting $1\frac{3}{4}$ by 6 inches with gudgeons and scarphed to the flat plate keel. The rudder is a $\frac{3}{4}$ inch flat plate with three forged arms shrunk and keyed to a 4-inch diameter post, carrying $2\frac{1}{4}$ -inch diameter pintles working in white metal bearings.

Frames are angles spaced 22 inches on centers and connected to the vertical plate keel by 18-inch floors and bracketed at the top to the deck beams. Forward in way of



U. S. Army Harbor Transport "General Frank M. Coxe"

cargo space on the main deck. Above this, on the saloon deck is a wooden deck house with accommodations for army officers and enlisted men's families, with the pilot house above, arranged with quarters for the ship's officers and radio.

The propelling machinery consists of two triple expansion reciprocating engines of 525 horsepower each, with steam supplied from two oil burning Ward boilers working at 200 pounds pressure, the hull and propelling machinery being built to the requirements of the American Bureau of Shipping for classification A I E.

STRUCTURAL DETAILS

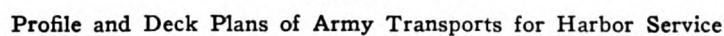
The stem having a slight rake forward, is a forged bar $1\frac{5}{8}$ by 6 inches scarphed at the fore-foot to a steel casting,

the double bottom the frames are cut and bracketed. The vertical keel is carried 21 inches deep through the engine and boiler space, increased in depth forward as a divisional bulkhead in the fuel oil and water tanks.

The main deck is entirely plated and is raised 12 inches in way of engine and boiler rooms, supported by angle beams and center line pipe stanchions. The saloon deck is plated amidship with tie plates and a wood deck at the ends. The boat deck is $1\frac{1}{2}$ -inch tongued and grooved yellow pine covered with number 4 canvas carried on steel beams and a carline with railing stanchions.

Six bulkheads divide the hull into watertight compartments, with the peak tanks used for reserve fresh water. The fuel oil tanks are in the double bottom under the forward crew space. Aft of the engine room there is a non-watertight flat over the shaft tunnel arranged as a crew space and work room.

The pilot house is raised 30 inches above the boat deck, and is equipped with a steering stand, a $7\frac{1}{2}$ -inch Ritchie

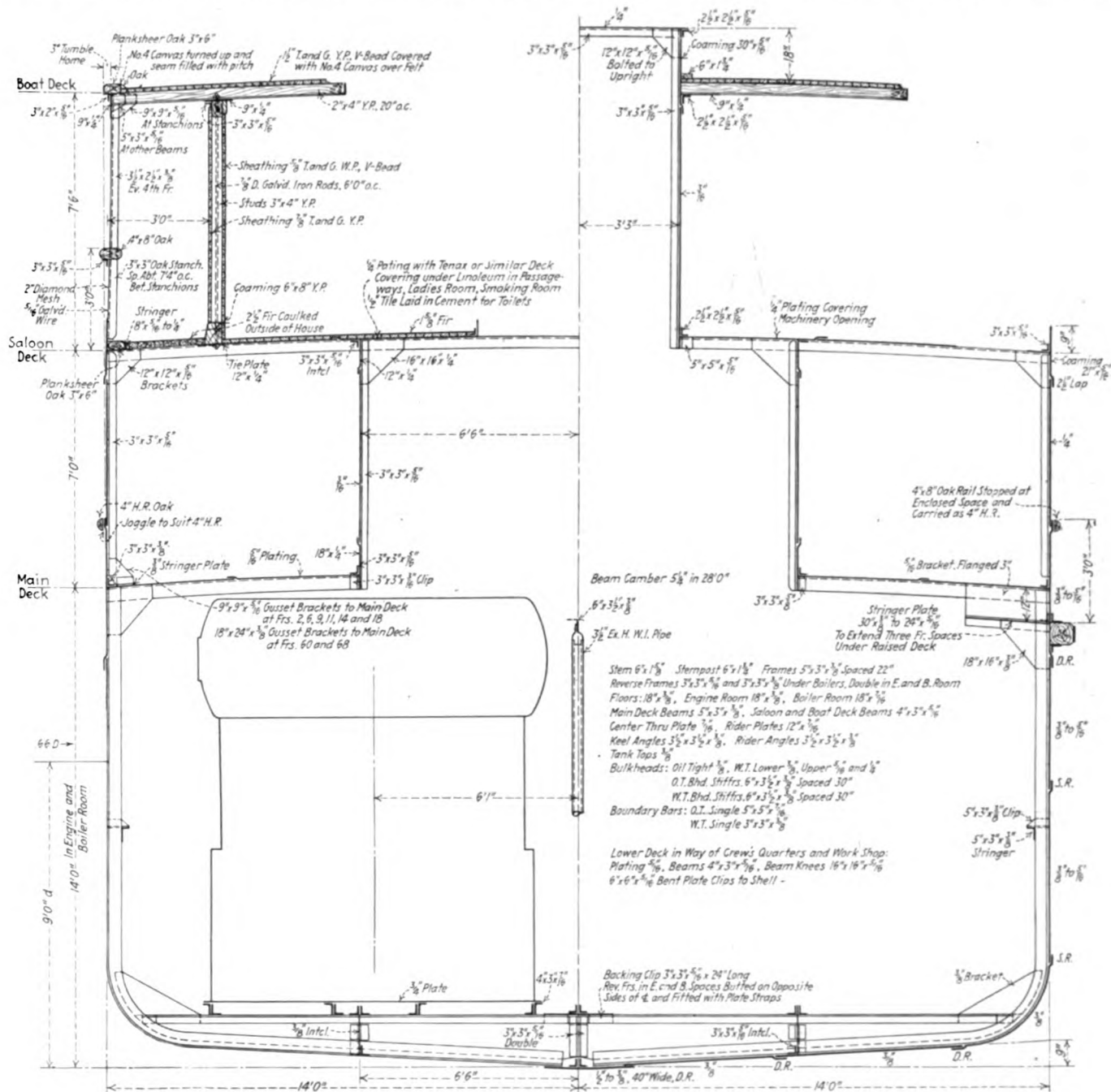


compass and binnacle, a 1,000-watt concentrated filament searchlight, a double faced engine telegraph with repeater, and a Brown electric tachometer indicating each engine, ahead or astern motion and the revolutions per minute.

In the Texas house separate quarters are arranged for the master, first officer and chief engineer, with a tiled toilet and

and their wives, very comfortably equipped with leather cushioned wicker arm chairs and a circular settee finished in mahogany.

Forward and aft of the saloon deck house there is an awning covered quarter deck with an open promenade on either side, sheltered by the boat deck. Aft there is a stairway



Midship Section

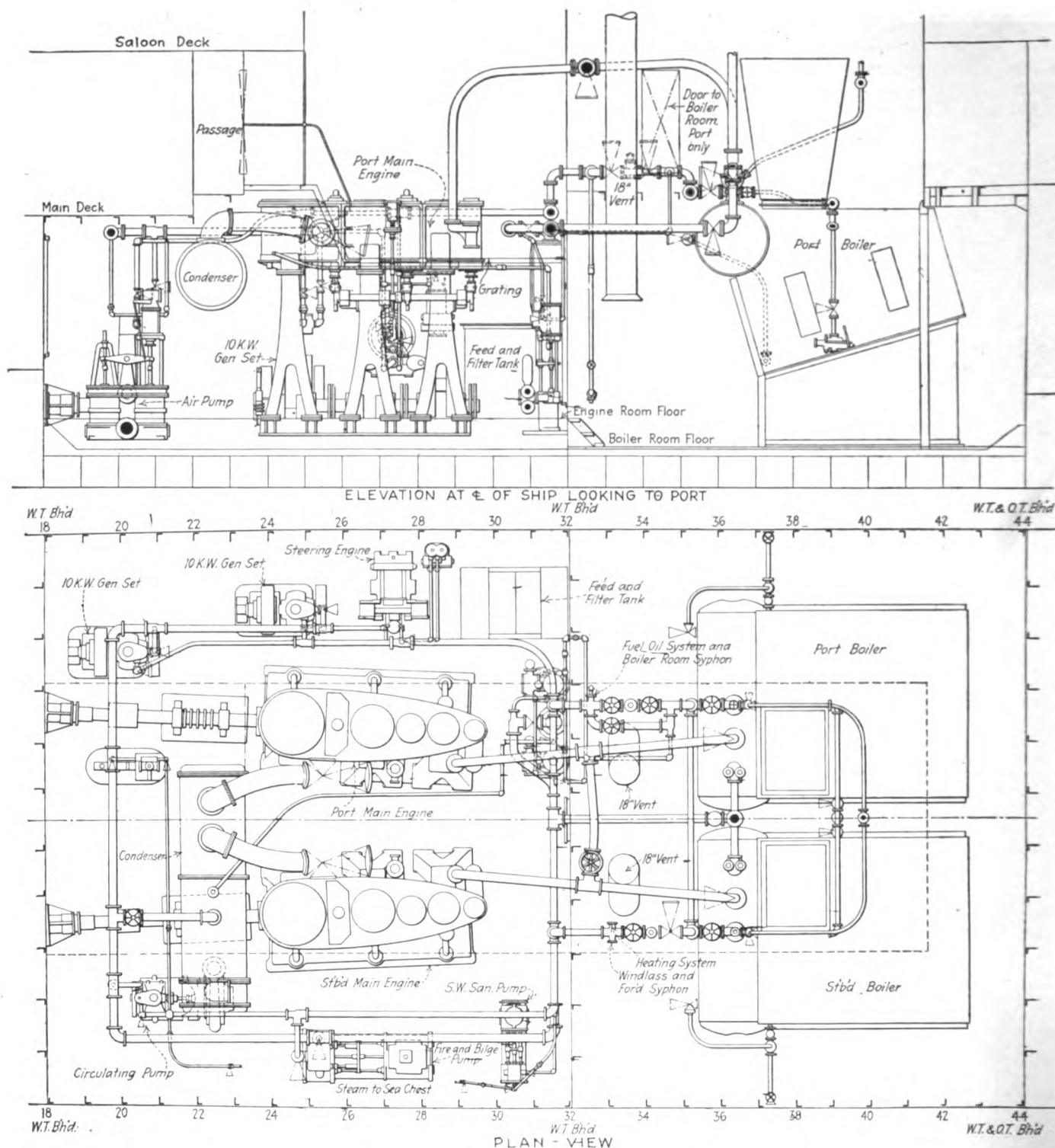
shower bath, hot and cold water. A chart and radio room is located on the port side immediately aft of the pilot house.

The saloon deck house, 7 feet 6 inches in height, is of wood construction. In the forward end there has been provided a saloon for the enlisted men's families. This room takes the full width of the house with a comfortable settee on all sides and a separate toilet adjoining. Immediately aft of this saloon, there is a passage and companionway to the main deck. On the starboard side there is a commodious lounging and smoking room and on the port side a ladies' room with lounge bureau, writing desk and toilet. The aft portion of the house is given over to a social room for the officers

to the main deck with promenade and cabin for the enlisted men, equipped with oak slatted seats.

The forward end is devoted to cargo space, access being through watertight cargo ports in either side of the superstructure, with a hatch to the hold and companionway to the forward crew's quarters. There is a stairway leading to the saloon deck and passage aft, to the officers' mess room, galley, crew's mess, second engineer's stateroom and toilets. Additional crew's space for oilers and firemen is provided aft of the engine room just below the main deck.

The main propelling machinery consists of two Ward watertube boilers fitted with the Woolley system of oil firing,



Elevation and Plan of Machinery Space

forced draft being obtained from a turbo blower mounted on the front of each boiler. Two direct acting reciprocating triple expansion engines 12 inches by 19 inches by 32 inches by 24-inch stroke at 150 revolutions per minute, deliver 525 indicated horsepower each.

The propellers are of the solid four-blade type.

The system of oil firing is especially worthy of comment. One of the more recent systems developed for the burning of oil, that of the E. L. Woolley Company of Providence, Rhode Island, was installed and has proven very satisfactory on trial. This system is simple in design and operates at low atomization pressure, only about 80 pounds. It has the

customary installation of twin fuel pumps and heaters, is governor regulated and equipped with the necessary gages, thermometer, air chamber, meters and duplicate suction and discharge strainers. The main point of interest, however, is the furnace front and burner. The furnace front is a simple cylindrical box with the end concaved with rectangular ports in the sides for the admission of air, which may be throttled to give the desired spiral effect to the entering air at the burner tip and regulate the desired quantity of air. The burner is in a fixed position and consists of but a strainer, atomizer and tip. The only adjustment required is in the size of atomizer used, of which several sizes are fur-

General Data: U. S. War Department River Type Steamers

General Information

Service: Harbor and Sound.
Builder: The Charles Ward Engineering Works,
Charleston, West Virginia.
Owner: U. S. War Department, Quartermaster
Corps.

Characteristics

Length, overall 150' 0"
Length, between perpendiculars 144' 0"
Breadth, molded 28' 0"
Depth, molded 13' 0"
Draft, mean 9' 6"
Block coefficient 0.67
Maximum speed, loaded 14 statute miles per hr.
Framing Transverse
Class A 1 E American Bureau of Shipping
G. M.—Loaded 1.1
Light 1.17'

Tonnages

Load displacement 707 tons at 2,240 lbs.
Light 517 tons
Deadweight capacity 190 tons
Hull and equipment 338 tons
Machinery and auxiliaries 129 tons

Equipment

Anchors:
2 stockless 700 pounds
2 chain at 45 fathoms 13/16 inch studlink

Rudder

Area 17.3 sq. ft.
Diameter stock 4½ inches
Center pressure abaft center line pintles 1.73 ft.

Complement

Deck officers 2
Deck crew 6
Engineer officers 2
Engine crew 4
Steward's department 2
Passengers 500

Deck Machinery

Steering gear, Hyde steam, 4½" x 4¼".
Windlass, spur gear, 4¼" x 6" hor. engs.

Life Saving Equipment

2 life boats, steel capacity 20 persons
1 life raft capacity 7 persons
Life preservers 525

Propelling Machinery

Boilers

Number 2
Type Ward watertube
Evaporative capacity 18,000 pounds per hour
Burners, type 2 each boiler
Fuel Woolley
Draft, forced turbo blower
Total heating surface 2,145 sq. ft.
Total grate surface 51 sq. ft.
Working pressure 200 pounds per square inch
Normal fuel consumption
1.26 pounds per indicated horsepower per hour

Engines

Number 2
Type reciprocating triple expansion
Size 12" x 19" x 32"—24" stroke
Horsepower, each 525

Propellers

Number 2
Type solid cast steel, 4 blades
Diameter 7' 8"
Pitch 10' 10"
Revolutions per minute 150
Proj. area 16.74 sq. ft.
P. A. to D. A. area 0.333

Auxiliary Machinery

1 surface condenser, 1,400 sq. ft., "Union Steam."
Feedwater heater, 1 Reilly No. 6, type D.
Fuel oil heater, 2 Whitlock No. 10, type R.
One air pump, Davidson beam, 8" x 16" x 12"
vertical.
Two feed pumps, Wagener, 8" x 5" x 12" vertical.
One feedwater sanitary pump, Union, 4-1-2" x 5¼"
x 4" vertical.
One S. W. sanitary pump, Union, steam, 6" x 5¼"
x 6" horizontal duplex.
One Wagener fire and bilge pump, 12" x 8" x 12".
One cir. pump, Union, 8" suction D. C., 6¼"
6" vertical.
Two Blake-Knowles fuel oil pumps, 5¼" x 3¼"
x 5".
Two Turbo fans.
Two Engberg generators, 10 K. W.
Radio, ½ K. W.

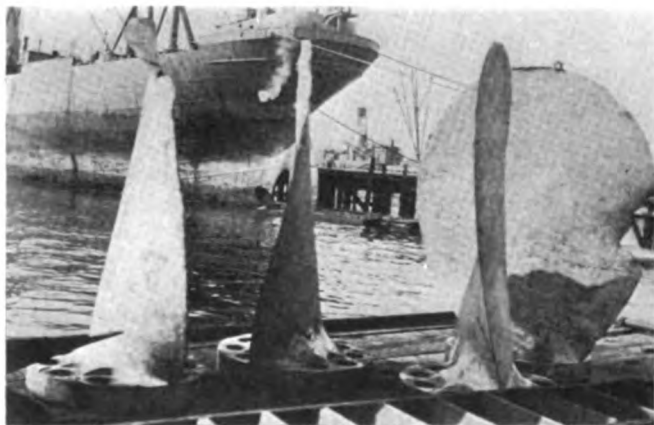
nished, regulating the quantity of oil burned per pound of pressure.

In order to avoid the influence of insufficient depth of water on the trial results, it was decided to run to trials to New Orleans, in a uniform depth of water, of about 90 feet.

Shortly after completion, the boats left Charleston on their delivery trip and when New Orleans was reached, both speed and endurance trials were run, from which interesting data and curves were obtained, which are reproduced on the accompanying data sheet.

During the delivery trip, these vessels proved to be very seaworthy while negotiating unprotected stretches in bad weather, on the routes from New Orleans to New London and from Panama to San Francisco. Although designed primarily for river and harbor work, these boats have all the qualities required for ocean going craft.

CHAIRMAN O'CONNOR of the Shipping Board, answering a resolution of inquiry adopted by the Senate, has advised that body that the board has no plans for moving the offices of the Emergency Fleet Corporation to New York and that the matter is not being considered.



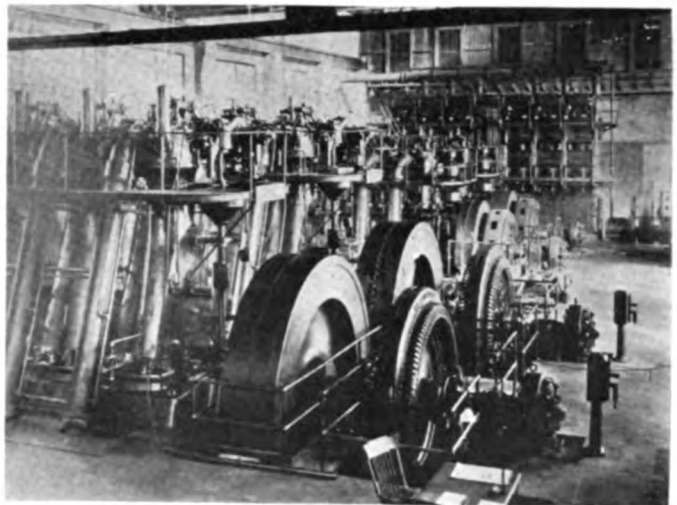
Damaged Propeller Blades Taken Off the Empress of Australia After the Earthquake in Yokohama

The blade at the left of the photograph, which is turned over at the tip, struck a concrete wharf; the blade at the right, with the piece out of the edge, was damaged by fouling an anchor cable.

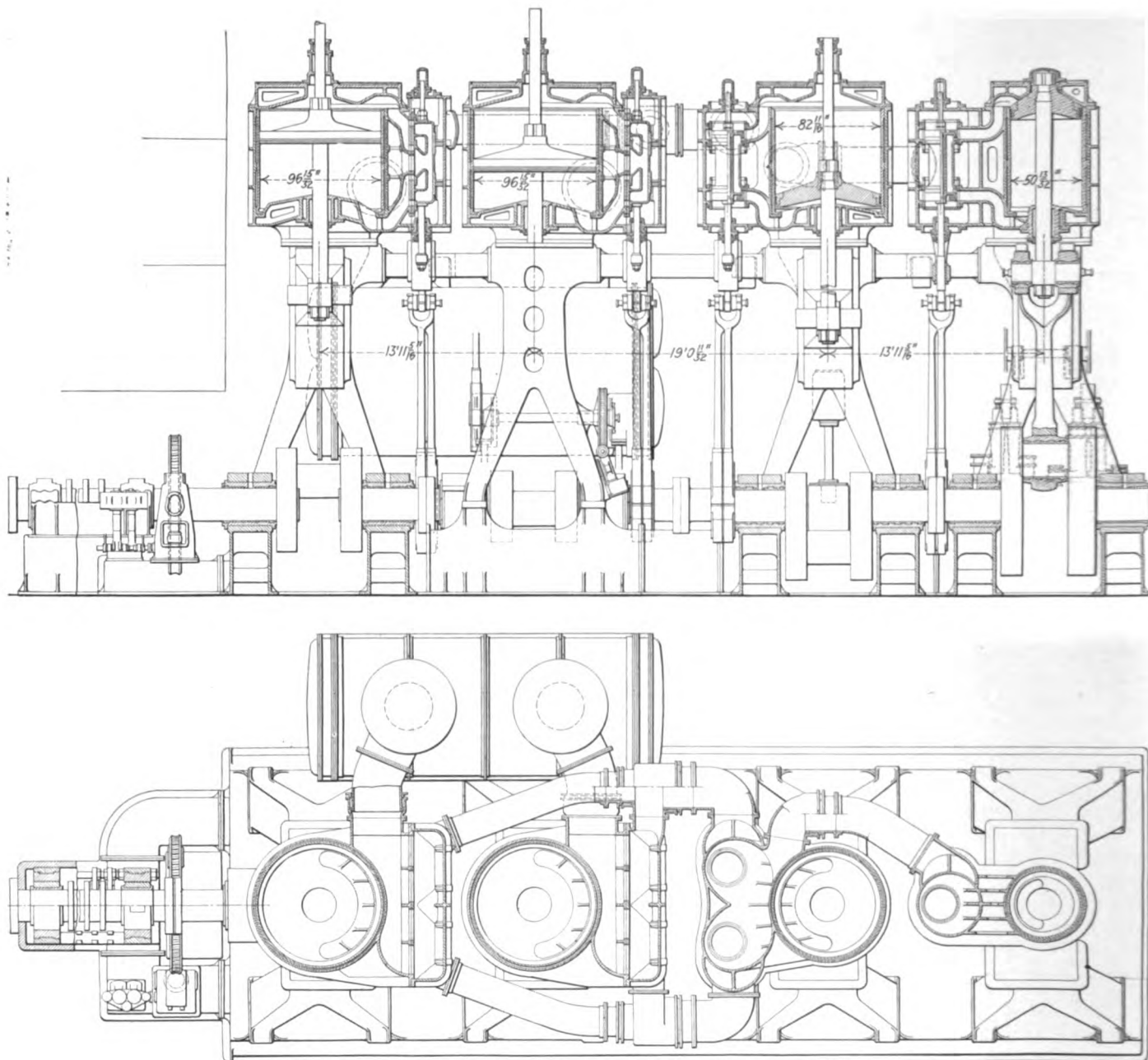
Marine Diesel Engine Installed in Stationary Power Plant

ONE of the Diesel engines built for the U. S. Shipping Board has been converted into a Diesel-electric generating unit, and is now in regular service in the plant of the Tucson Gas, Electric Light & Power Company, of Tucson, Arizona. Sometime ago this company turned from steam-electric to Diesel-electric generation on account of the heavy freight on fuel and the scarcity of water, and the addition of the new unit raised its capacity to 3,000 horsepower of Diesel engines in regular operation.

Some of the engines have been in service for 12 years and are running as economically and as well today as when first installed. The large engine in the background of the illustration can be recognized as of the marine type, and is a 6-cylinder, 1,000 brake horsepower Pacific Werkspoor Diesel engine, direct connected to a 925 KVA Westinghouse generator. The engine has now been running very satisfactorily for three months.



Pacific Werkspoor 1,000 Brake Horsepower Marine Diesel Engine with Westinghouse Generator and Direct Connected Exciter Can Be Seen in the Background



S. S. Columbus: Main Engine

Propelling Machinery of German Passenger Steamship Columbus*

By Dr.-Ing. E. Foerster

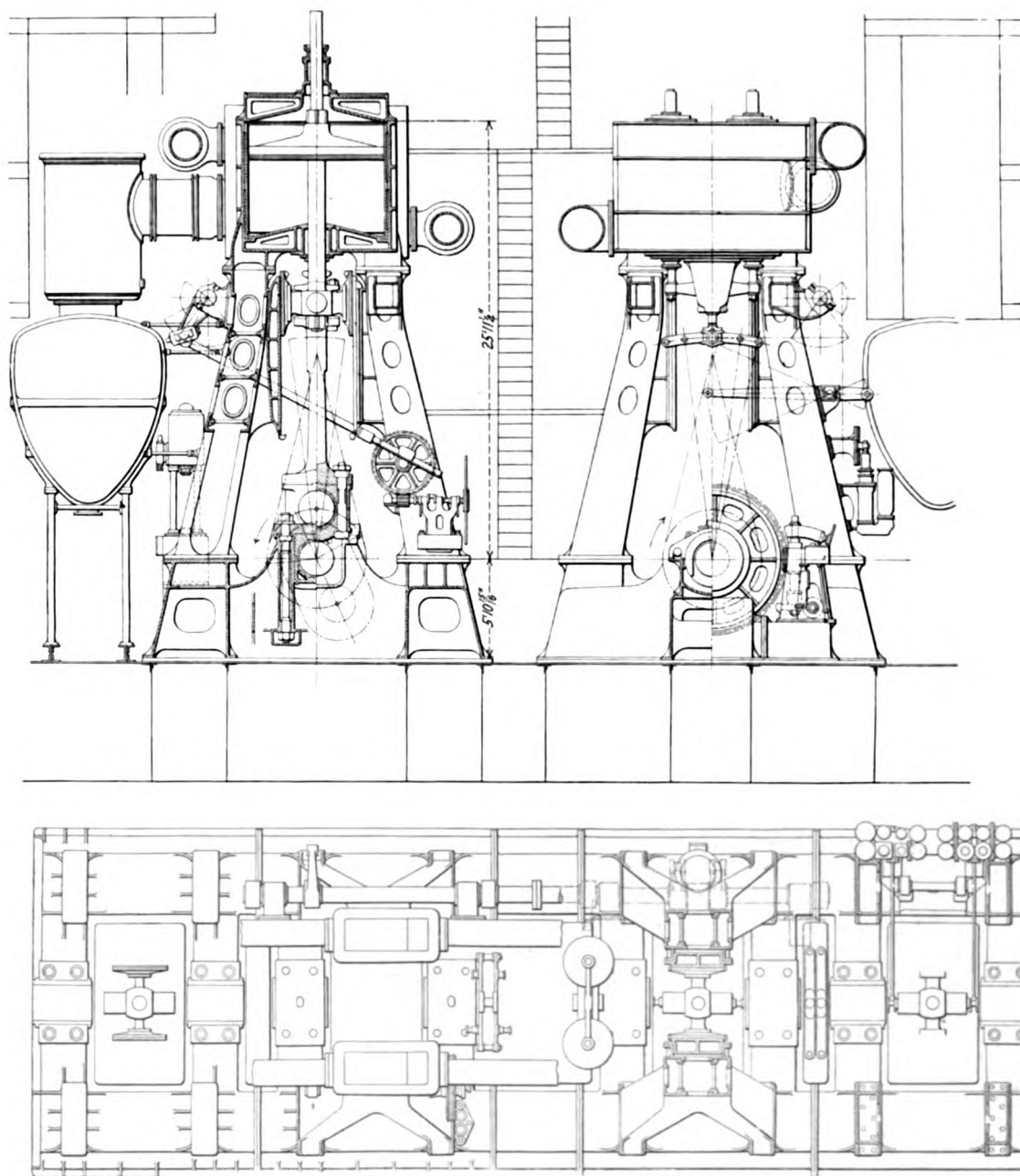
WHEN the first *Columbus* (now the *Homeric*) and her sistership, the present *Columbus*, were ordered before the war, the experience with geared turbines and internal combustion motors was not far enough advanced to warrant, in the opinion of the responsible men in the North German Lloyd, the adoption of either of these methods of propulsion. On the contrary; this company and the Schichau Company which had the orders were of the opinion that the economy of reciprocating engines of the modern Schichau type was almost unsurpassable. In fact the machinery of the *Homeric* proved to be an absolute success,

*The hull, accommodations and deck machinery of this vessel, were illustrated and described in the February issue of MARINE ENGINEERING AND SHIPPING AGE.

especially with respect to lack of vibration, quickness of maneuvering and small fuel consumption.

The main engines consist of two sets of the four cylinder triple type with one high pressure cylinder of 47.24 inches diameter, one intermediate pressure cylinder of 82.68 inches and two low pressure cylinders of 95.45 inches diameter each with 70.86 inches stroke. The bedplate is of cast iron and composed of four parts. The frames are of cast steel, the crank shaft, composed of four equal sections, is of nickel-steel, the total weight of the four parts being 113 tons. The main shaft is 25.19 inches in diameter. The line shafting consists of seven pieces of equal length, each weighing 16 tons, but the propeller shaft has a length of 46 feet; it is 26.77 inches in diameter, weighs 38 tons. This part of the shafting is of nickel-steel. The propeller shaft may be drawn either into the tunnel or outboard. The propellers are 23 feet 7½ inches in diameter, each having four blades of manganese bronze. The weight of each propeller is thirty-nine tons, twenty-six of which is for the four blades.

The boiler plant consists of twelve double ended Scotch



S. S. Columbus: Transverse Section and Framing of Main Engine

boilers with a total heating surface of 73,469 square feet, the working pressure being 206 pounds per square inch. The boilers are equipped with superheaters and forced draft. The funnels are of elliptical section with a long axis of 20 feet 3 inches, a short axis of 18 feet 4 inches and a height above water of 125 feet. The forced draft is supplied by eight fans, each driven by a special steam engine. The main steam piping is arranged to make each of the main engines independent of the others. Special groups of valves provide that each engine may get steam from each of the two boiler groups.

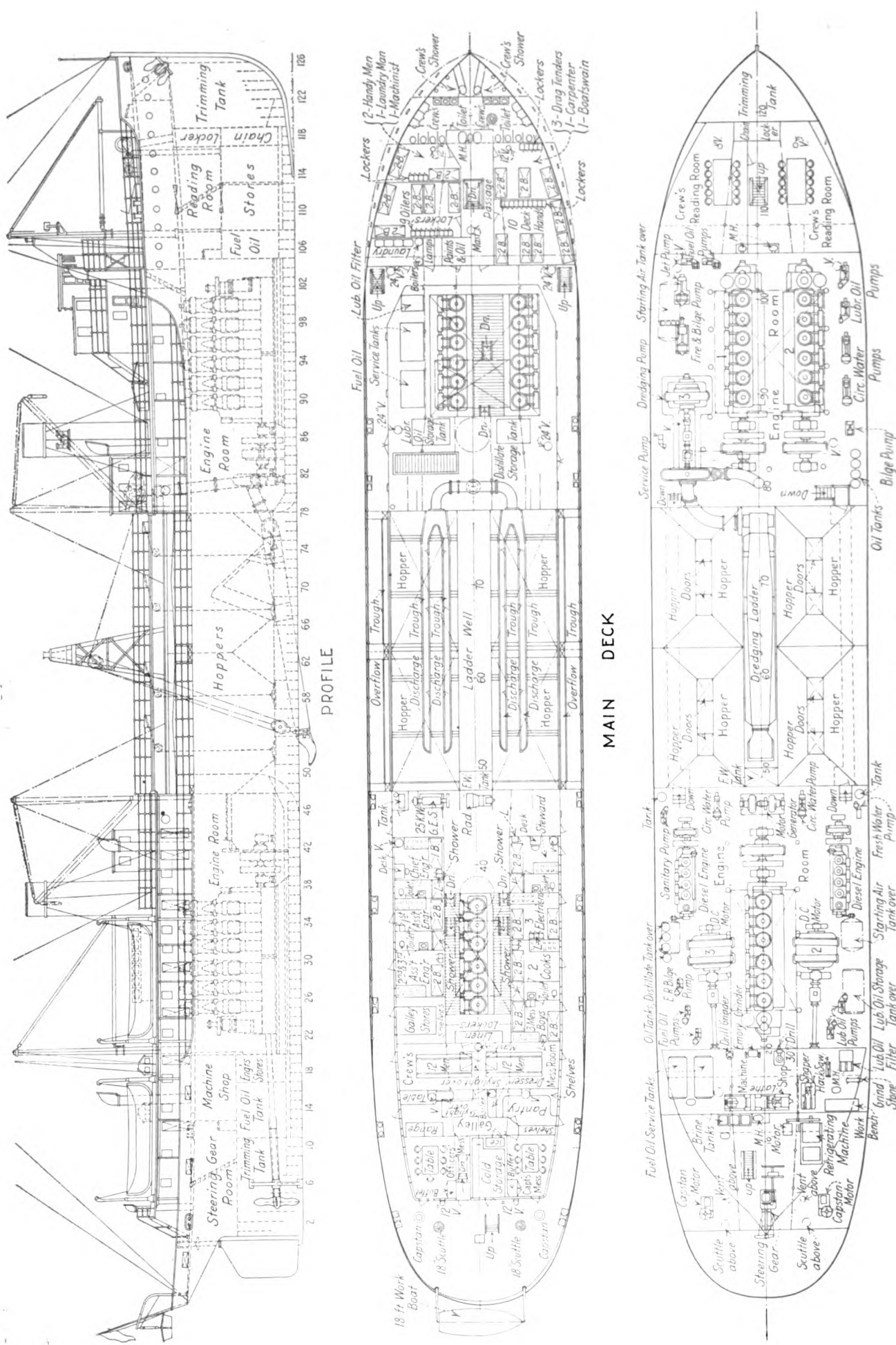
The boiler plant is arranged for oil fuel. The oil is carried in the bunkers originally provided for coal. For each boiler room there are two fuel pumps, two oil heaters, two suction filters and two pressure filters, one unit being in reserve. Special pumps for bunkering are provided, enabling the ship to take on 6,000 tons within 18 hours.

The electric plant has been installed in accordance with the rules of the German standards committee for the mercantile marine. There are 5 steam dynamos each of 140 kilowatts (115 volts) and one steam dynamo of 90 kilo-

watts; and, in addition, one emergency dynamo of 95 kilowatts (115 volts) is located in the *D* deck. The vessel contains 33 electric circuits for light, 20 for heating and 22 for power. The emergency dynamo feeds 27 circuits for light and 14 for power.

The total length of electric conductors in the vessel for light, power and heating amounts to approximately 72 miles. There are 5,600 stationary and 125 portable incandescent lamps. The electric power is distributed for the various purposes as follows: For ventilation, 491 horsepower; for the steward's department, 31 horsepower; for lifts and winches, 338 horsepower; for pumps, 91 horsepower; for workshop, printing office and gymnasium, 14 horsepower; altogether, nearly 1,000 horsepower.

There are 294 electric heaters in the passenger accommodation. An enormous number of electrical appliances for manifold purposes are installed on board the vessel; there are 14 electrically heated warming plates in the first class dining room; 4 electrical cooking and baking stoves, two baking ranges, several toasters and numerous smaller machines for all kinds of work in the food department.



LOWER DECK AND HOLD
General Arrangement Plans of Army Dredge

First Diesel-Electric Army Dredge Completed

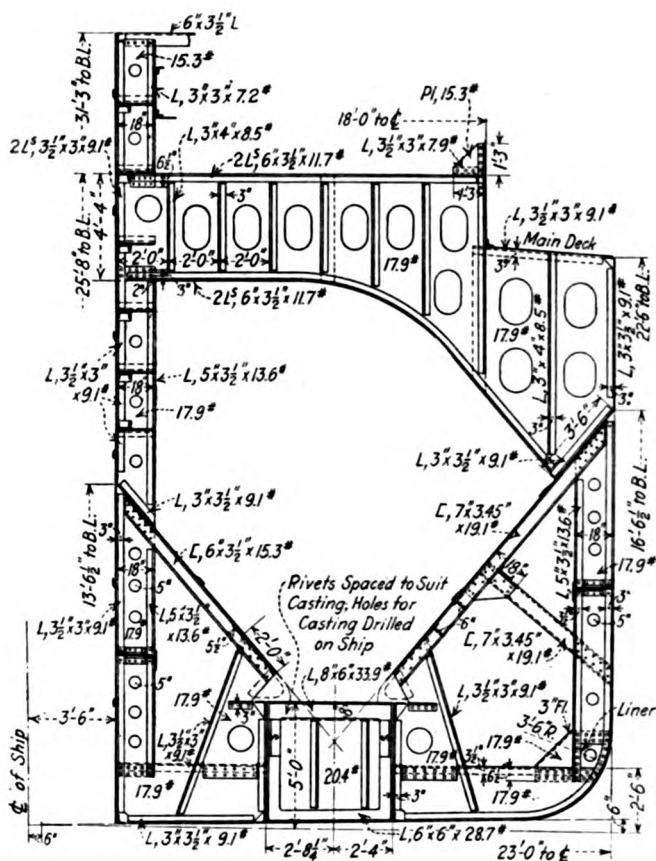
Sea-Going Hopper Dredge of Radically New Type for Harbor Service — Electricity Used for Propulsion and Operation

PERHAPS the most interesting vessels, from an engineering point of view, at present under construction in this country, are the hopper dredges which are being built by the Sun Shipbuilding and Dry Dock Company, Chester, Pa., for the Corps of Engineers, U. S. Army.

The first of these vessels, the *A. Mackenzie*, had her contract trials in March and the remaining three, the

over sheaves attached to an "A" frame built over the well and then to a powerful winch located in the drag tender's house.

The material is sucked through a tube lying along the axis of the ladder, through the trunnion joints and pump, and discharged into the hoppers, which are provided with eight watertight cast steel doors in the bottom that can be



Midship Section

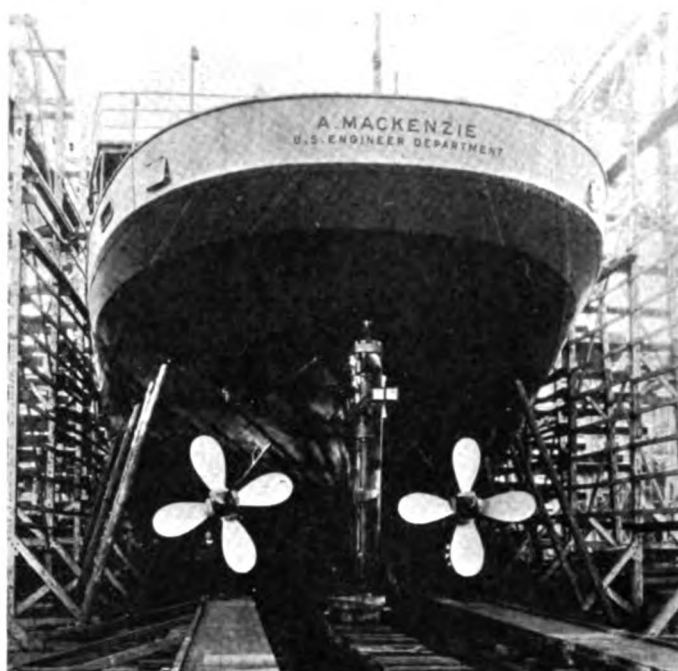
W. L. Marshall, Dan C. Kingman and William T. Rossell, are rapidly nearing completion.

MAIN PARTICULARS

The principal dimensions and particulars are as follows:

Length overall	268 feet 5 inches
Length between perpendiculars	254 feet
Breadth molded	46 feet
Depth molded	22 feet 6 inches
Deadweight 2,000 tons on a draft of	19 feet 6 inches
Capacity	1,250 cubic yards
Speed	11½ knots

The hulls are framed on the transverse system, all material being specified to meet American Bureau of Shipping requirements. The dredging machinery is of the suction type with the dredge ladder located in the centerline of the vessel in a well between the two hoppers, which have a total capacity of 1,250 cubic yards. The ladder is swung between trunnions located at the forward end of the well and is raised and lowered by tackle attached to the suction mouth and carried



View of the Stern of the Mackenzie Before Launching of the Vessel

opened for dumping into a basin or other repository. The hoppers can also be emptied by pumping ashore through a side discharge.

The machinery is located in two compartments immediately forward and aft of the hoppers, connected by port and starboard passageways running under and alongside of the hoppers.

PROPELLING MACHINERY

The principal interest in these vessels, to the engineering profession, is the application of Diesel-electric power to both propelling and dredging.

The after machinery compartment contains the propulsion units, two in number, one to each shaft. Each unit consists of a Westinghouse 800 horsepower, 480 volt, double armature propelling motor turning the propeller at from 90 to 110 revolutions per minute. Between the propelling motors is located a 1,000 brake horsepower McIntosh and Seymour Diesel engine, directly coupled to a 700 kilowatt, 500 volt, 150 revolutions per minute, Westinghouse generator. This compartment also contains two auxiliary generating sets, each consisting of a McIntosh and Seymour 225 brake horsepower Diesel engine directly connected to a Westinghouse 150 kilowatt, 150 volt, 275 revolutions per minute generator, and one Westinghouse 150 kilowatt 480/250 volt, 1,200 revolutions per minute motor generator set.



cannot be re-established with improper voltage ratio between generator and motor. There is also provided a transfer switch to transfer control to the pilot house. A 25 kilowatt gasoline starting unit is installed on the main deck above the after machinery compartment.

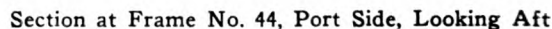
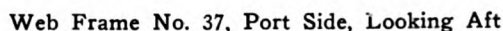
The electrical equipment is Westinghouse throughout. The generators and motors have independent forced ventilation.

On a gallery, at the forward end of the after machinery compartment, is located the main switchboard. On it are mounted all the necessary instruments for controlling, operating and indicating all the electrical machinery and propulsive equipment of the ship. Among these is an eight-point switch making eight possible combinations between the generators and propulsive units. This selector switch is operated by a hand wheel and the switches are opened and shut by cams mounted on a shaft which is interlocked so that it cannot be rotated when closed and voltage has been applied to the control circuits, or, if the circuit has been interrupted, it

The deck machinery, which includes steering gear, windlass, two capstans, three winches and a hydraulic ram for operating the hopper doors, is all electrically driven.

The vessels have a forecandle in which are berthed the crew proper and on the deck below are two large reading rooms. On the forecandle deck is a deck house containing four rooms for officers and crew. Above this house is another containing the commanding officer's cabin and pilot house. The drag tender's house is located at the after end of the forecandle deck and contains the winch for operating the drag and suction ladder. On the after part of the boat deck is located the wireless house, two 24-foot lifeboats, a 24-foot motorboat and a liferaft.

Galley equipment on the dredges includes eight 4-foot



section electric ranges supplied by the Edison Electric Appliance Company, Inc., Chicago. Every section has a top heating surface composed of four cast iron plates into which has been cast a helicospiral steel-cased heating unit so that the plate and unit are in effect one.

The after deck house contains rooms for the engineering crew, galley storerooms and cold storage cooled by a CO₂ refrigerating machine located on the main deck aft, which also contains the screw steering gear; all electrically driven. All the above mentioned quarters are heated by electricity.

Each mast is fitted with a five-ton boom and the two king posts on the port side, at the forward end of the well, are each fitted with a 10-ton boom. The stacks are utilized for ventilation as well as for the mufflers and other auxiliaries.

An extended trial of the *A. Mackenzie*, the first dredge to reach completion, will be carried out in New York harbor this month. The results of these trials together with further illustrations of the vessel will be published in our May issue.

New Swedish Motorship

THE motorship *Nuolja*, built by A. B. Götaverken of Gothenburg for Swedish owners, was given a trial trip on December 29, 1923.

The main dimensions and particulars of the ship are as follows:

Length overall	421 feet
Length between perpendiculars.....	405 feet
Breadth (molded)	55 feet
Molded depth to shelter deck.....	37 feet 6 inches
Draft on summer freeboard	28 feet 6½ inches
Deadweight capacity on summer freeboard.....	10,500 tons

The vessel is of the closed shelter deck type with two decks and 4-foot high forecastle, and is built to the highest classification of Lloyd's Register of Shipping. The deck machinery, steering engine, winches and windlass are all electrically driven. The vessel is also equipped with wireless telegraph, submarine signaling and refrigerating plant.

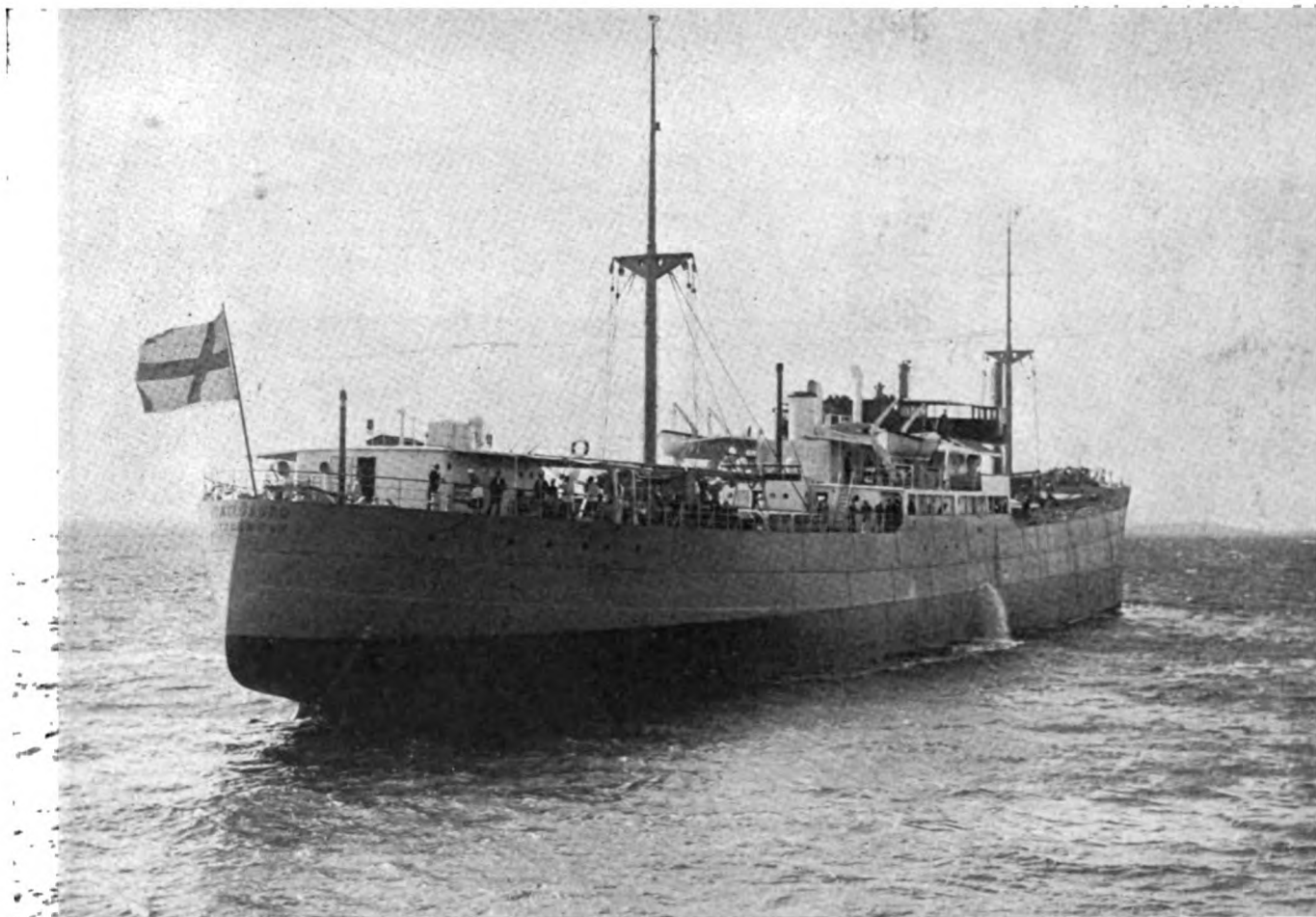
The machinery consists of two Götaverken-built Burmeister & Wain type four-cycle, single-acting Diesel engines. On the trial trip the engine developed normally 2,750 indicated horsepower at 133 revolutions per minute, giving the vessel a mean speed of 11.1 knots. The recorded fuel consumption was 0.308 pound per indicated horsepower.

The vessel has double bottom tanks of 410 tons capacity for fuel oil for the machinery and in addition 1,365 tons of oil can be carried in the double bottom. The total ballast capacity is 4,100 tons distributed in the double bottom, peak tanks and one deep tank amidships.

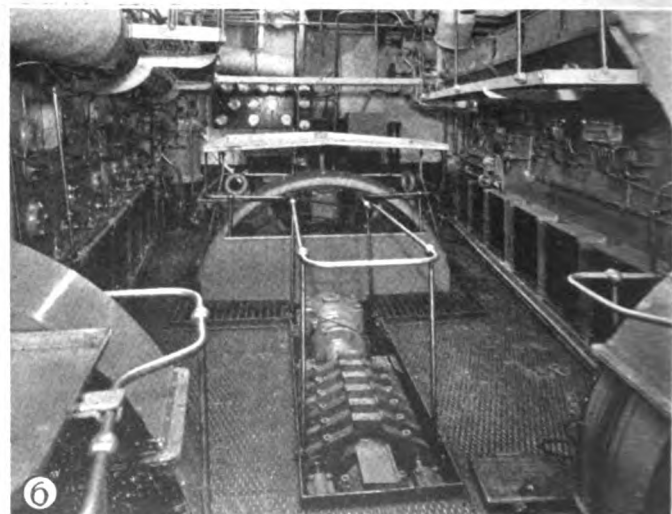
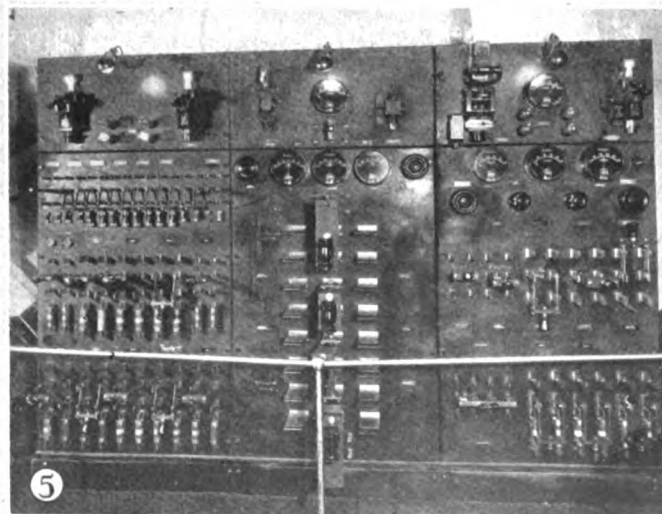
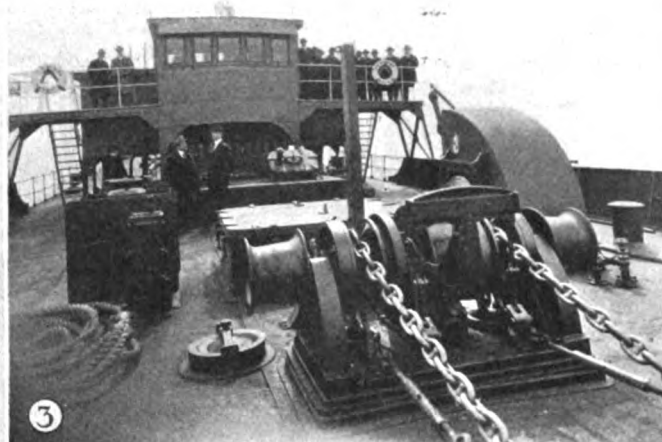
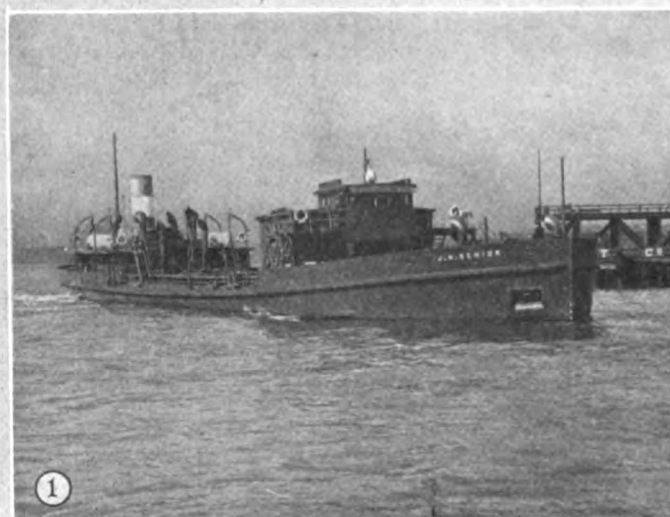
Three Götaverken's Burmeister & Wain Diesel engines, each of 75 brake horsepower, are installed in the engine room and connected directly to dynamos of 50 kilowatts, 220 volts and 325 revolutions per minute.

The electrically driven auxiliaries are: Two cooling water pumps, one ballast plunger pump of 100 tons capacity, one ballast centrifugal pump of 350 tons per hour capacity, two combined bilge and sanitary pumps, two lubricating oil pumps, one air-compressor connected to a 90 horsepower electric motor, one 15 horsepower toothed wheel pump for fuel oil. Besides there is one steam-driven auxiliary air compressor.

An oil-fired Cochran boiler having 100 square feet of heating surface is located in the engine room aft for the heating apparatus, auxiliary air compressor and distiller.



Twin Screw Swedish Motorship *Nuolja*, of 10,500 Tons Deadweight Capacity, Equipped With Burmeister & Wain Type Diesel Engines of 2,750 Indicated Horsepower



Motor Tanker J. H. Senior: (1) Vessel on Trial Run; (2) Deck View, Showing Cargo Pipe Lines; (3) Electrically Operated Windlass; (4) Interior of Pilot House, Showing Controls; (5) Switchboard; (6) Looking Forward in the Engine Room



Electrically Propelled Motor Tanker J. H. Senior

Diesel-Electric Tanker Added to Standard Oil Fleet

New Vessel Makes Favorable Impression on Exhibition Run at Baltimore—Handles with Ease and Precision from Pilot House

THE latest vessel to be added to the fleet of the Standard Oil Company of New Jersey is the motor tanker *J. H. Senior*. Completed early this year by the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., this remarkable little vessel was given a very successful builder's trial in Chesapeake Bay on February 21 and is now in service at Baltimore.

On March 14, an exhibition run of the vessel was made in Baltimore harbor with officials of the oil company and of the Mackintosh & Seymour Company and the Westinghouse Electric Company, who together supplied the propelling machinery on board, as well as a large number of representative marine engineers and ship operators.

While the *J. H. Senior* commands attention as an embodiment of the latest ideas and most efficient methods of transporting oil in bulk, the principal interest of the guests on the trial was centered in the Diesel-electric machinery by which the vessel is propelled and the means by which this machinery is controlled and the ship maneuvered entirely from the pilot house. During the run, the machinery functioned so perfectly and the vessel handled with such ease and precision as to excite the admiration and commendation of all who were present.

The principal dimensions of the *J. H. Senior* are shown in the table.

The vessel is designed for service in the waters of Chesapeake Bay and its tributaries and is of a type which the owners' experience has developed as being very suitable for service in inland waters.

She is intended for the carriage of gasoline and refined petroleum products in bulk and for that purpose, by means of a longitudinal bulkhead on the center line and numerous transverse

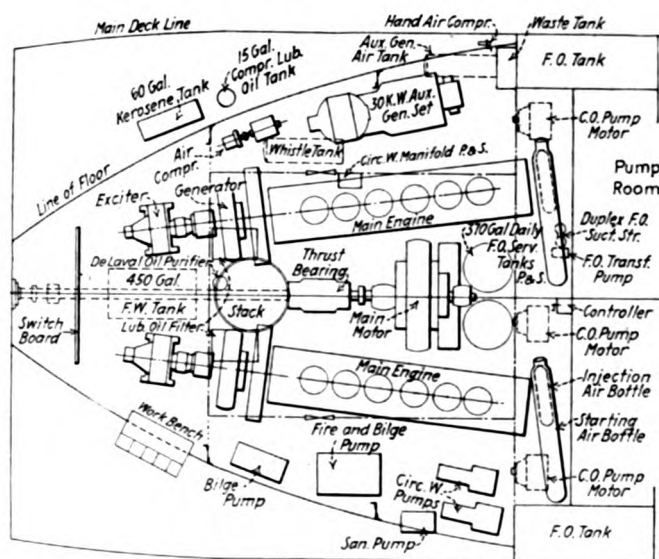
PRINCIPAL DIMENSIONS

Length over all	220 feet
Length between perpendiculars	210 feet
Breadth, molded	38 feet
Depth, molded	16 feet 6 inches
Load draft	13 feet
Light draft	4 feet 7½ inches
Displacement loaded about	2,300 tons
Deadweight cap. at 13-foot draft—salt water	1,600 tons
Capacity for fuel oil, stores, fresh water and crew	25 tons
Cargo capacity	574,800 gallons or 11,496 barrels
Designed speed loaded	8.5 knots
Shaft horsepower	450
Type of propeller	Solid—4 blade
Propeller, revolutions per minute	100
Propeller, diameter	10 feet
Propeller, pitch	10 feet
Developed area of propeller	32.4 square feet

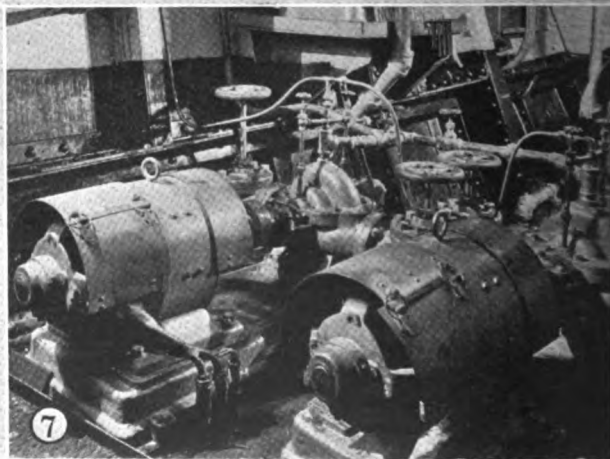
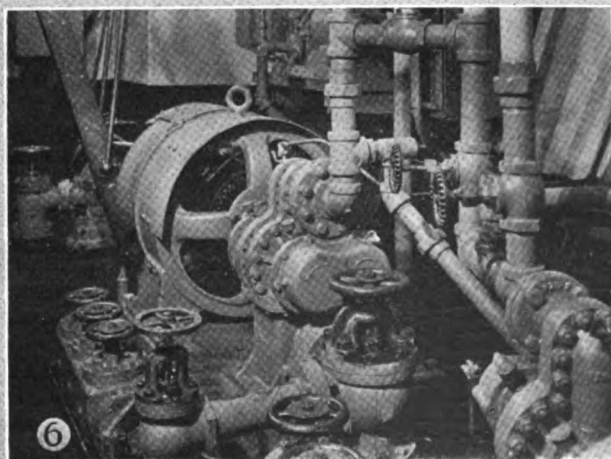
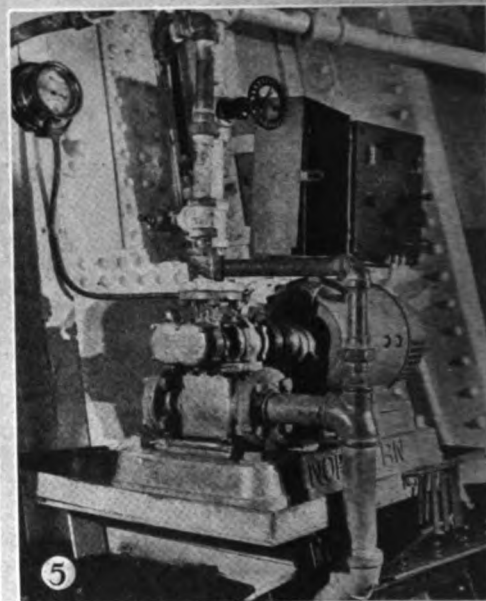
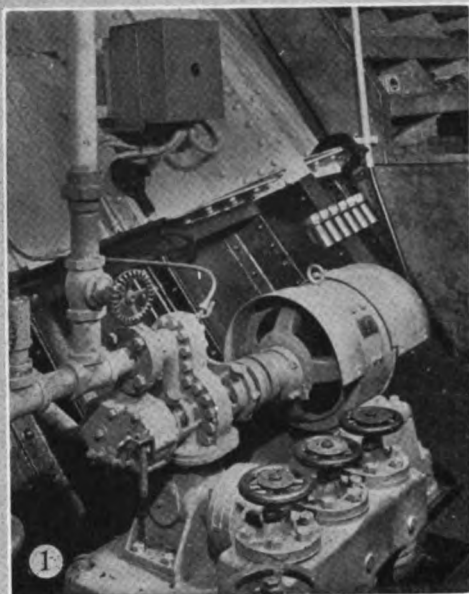
bulkheads, the hull is subdivided so as to provide ten compartments for the oil cargo.

Of these ten compartments, six are intended for refined oil and four for gasoline, and in order to avoid any possibility of these two products becoming mixed, through leakage from one tank into another, a specially constructed cofferdam 3 feet 6 inches wide, in which water may be carried, further subdivides the tanks, the refined oil compartment being located forward of it and the gasoline compartments aft. To allow for the expansion, trunks are fitted above deck over the tanks.

The penetrating nature of light oils is such that extreme care must be taken in the structural work in order that the tanks may be actually oil-tight. In this vessel the Stand-



Plan of Engine Room



Motor Tanker J. H. Senior: (1) Bilge Pump; (2) Generator and Exciter; (3) Cargo Oil Pumps; (4) Entrance to Pump Room; (5) Sanitary Pump; (6) Fire and Bilge Pump, Bilge Pump at Right; (7) Circulating Water Pumps

ard Oil Company's usual practice was followed, the oiltight bulkheads being fitted with double boundary angles and the rivets spaced about 3.6 diameters generally. The holes in the boundary bars were punched small and then reamed to the proper size in order to obtain fair holes, and rivets with countersunk head and swell neck were used. The seams and laps of all bulkhead plating are double riveted. The tanks were tested by filling with water under a test head of 6 feet above the top of the expansion trunks.

GENERAL ARRANGEMENT

The vessel is of the flush deck type and has one deck only. Steel bulwarks are fitted at the ends, but amidships open rails are fitted instead. The propelling machinery is located in the after end, all auxiliaries in connection therewith being located with it in one compartment. A pump room for the cargo oil pumps is located in a watertight compartment between the engine room and the cargo tanks, and at each side of the pump room there is an oil tank for carrying the Diesel engine fuel. The anchors are of the stockless type and are housed in special hawse pipes which enable them to be stowed entirely within the line of the hull, which is a very desirable feature for vessels operating in restricted waterways.

Besides the electric propulsion feature, and the use of electric driven auxiliaries, the vessel is heated by electric heaters, and electricity is also used for cooking, an Edison Electric Appliance Company's range being fitted in the galley.

Unusually comfortable quarters are provided in the deck houses for a crew of ten men and a refrigerating plant and cold storage room for ship's provisions is a modern feature.

DIESEL-ELECTRIC MACHINERY

The main propelling machinery consists of the following:

Two McIntosh and Seymour 6-cylinder, 4-cycle trunk piston, 13-inch bore by 18-inch stroke, 350 brake horsepower at 275 revolutions per minute, non-reversible Diesel engines, each direct connected to a Westinghouse 185-kilowatt, 115-volt, direct-current generator with one 35-kilowatt, 115-volt exciter. One 1½-cubic foot injection air and one 10-cubic foot starting air bottles are supplied with each main engine. Both tanks are charged with air at 1,100 pounds per square inch.

One 450-shaft horsepower, 230-volt, 100 revolutions per minute Westinghouse single armature, self-ventilated motor.

The main engines maintain a constant speed for all loads, variations in propeller revolutions being accomplished by the Ward-Leonard system of varying the strength of the main generator field. The two main generators are operated in series.

The main thrust bearing is of the horseshoe type. The forward and after stern tube bearings are of the Goodrich Rubber Company "Cutless" rubber type. Sand and grit do not become imbedded in the rubber surface and the life of the tail shaft liners, as well as the bearings themselves, is greatly prolonged. This is a desirable feature in this case, as the vessel will run on Chesapeake Bay and tributaries and at times will encounter shallow and muddy water.

AUXILIARIES

The list of all auxiliaries used on the ship is as follows:

One small motor-driven air compressor for initially charging starting and injection air tanks.

One auxiliary generating set consisting of a Fairbanks-Morse Type "C-O" engine, 3 cylinder, 2 cycle, 45 horsepower, at 400 revolutions per minute direct connected to a 30-kilowatt, 125-volt Fairbanks-Morse D. C. generator and provided with an emergency hand air starting system.

One fuel oil transfer pump—Northern Pump Company, 2-inch suction by 1½-inch discharge rotary, 20 gallons per minute, at 100 pounds and 1,150 revolutions per minute direct connected to a Westinghouse 2 horsepower, 115-volt compound wound motor.

Two circulating water pumps—DeLaval 3-inch suction by 3-inch

discharge centrifugal, 250 gallons per minute at 45 feet head and 1,700 revolutions per minute direct connected to a Westinghouse 5-horsepower, 115-volt, compound wound motor.

One sanitary pump—Northern Pump Company 2-inch suction by 1½-inch discharge rotary, 20 gallons per minute at 100 pounds, direct connected to a Westinghouse 20-23 horsepower, 115-volt, 550-800 revolutions per minute shunt wound motor.

One bilge pump—Northern Pump Company 3-inch suction by 2-inch discharge rotary, 60 gallons per minute at 75 pounds and 1,150 revolutions per minute direct connected to a 5-horsepower, 115-volt compound wound motor.

Three cargo oil pumps—Northern Pump Company 8-inch suction by 6-inch discharge rotary, 375 gallons per minute at 100 pounds and 300-426 revolutions per minute connected by gearing and shafting through an oil-tight stuffing box in the engine room bulkhead to Westinghouse 35-horsepower, 115-volt, 800-1,150 revolutions per minute compound wound motors in the engine room.

One ½-ton Brunswick refrigerating outfit.

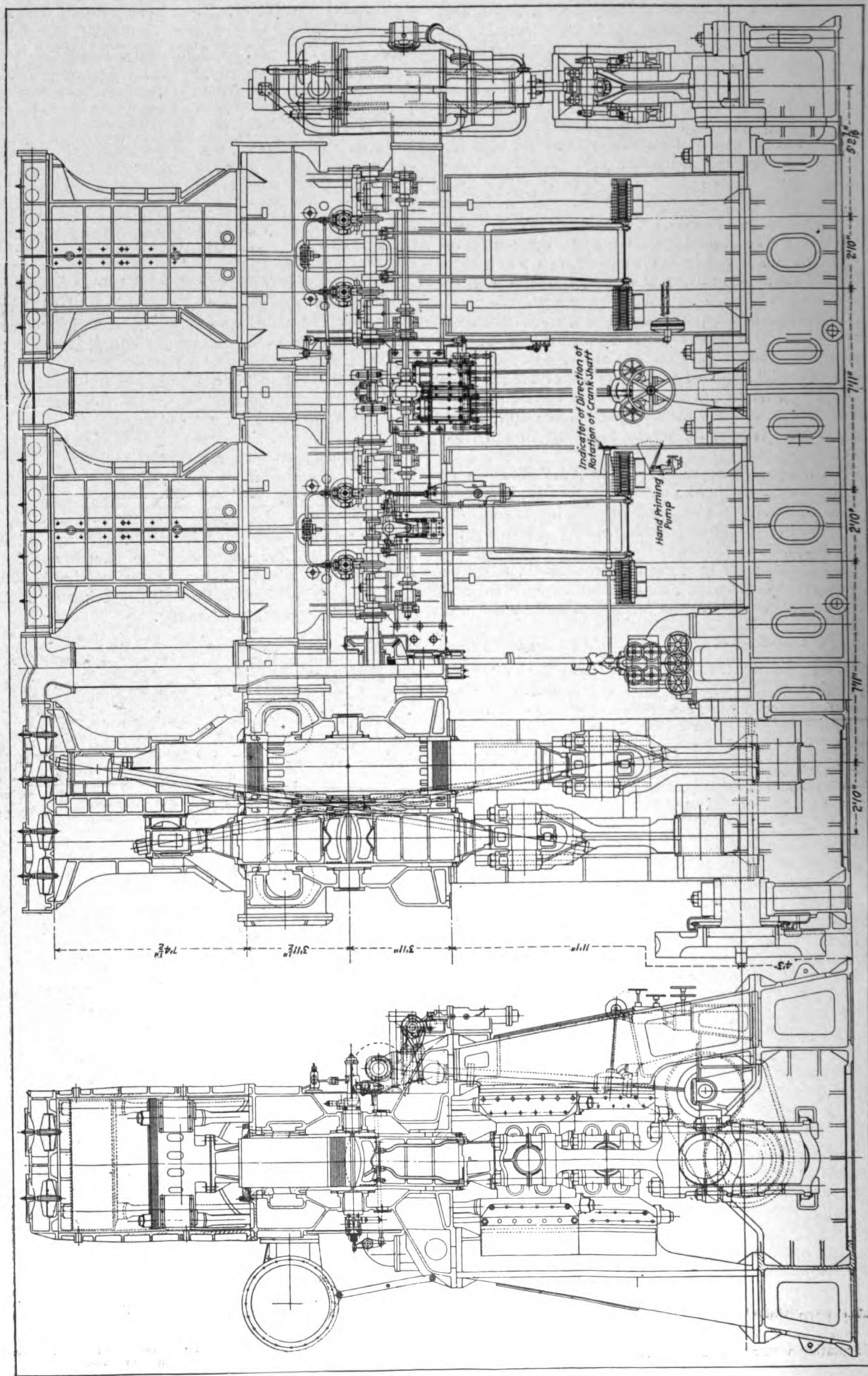
The steering gear, supplied by the Allan Cunningham Company of Seattle, consists of an electric motor, directly connected to the rudder-stock and controlled by a small lever in the pilot house. In this type of steering gear, no "follow up" is fitted, the motor continuing to run until the helm is hard over, if the control lever is held off center. To indicate the position of the rudder a series of colored electric bulbs is fitted in the control stand. These show clearly every 2½ degrees for small angles and every 5 degrees for large angles of helm.

NEW BETHLEHEM REPAIR PLANT.—J. J. Tynan, vice-president of the Bethlehem Shipbuilding Corporation at San Francisco, Cal., announces that the company will establish a ship repair plant costing approximately \$3,000,000 at Honolulu. The 525-foot floating drydock now at Alameda, Cal., will be moved to Honolulu.

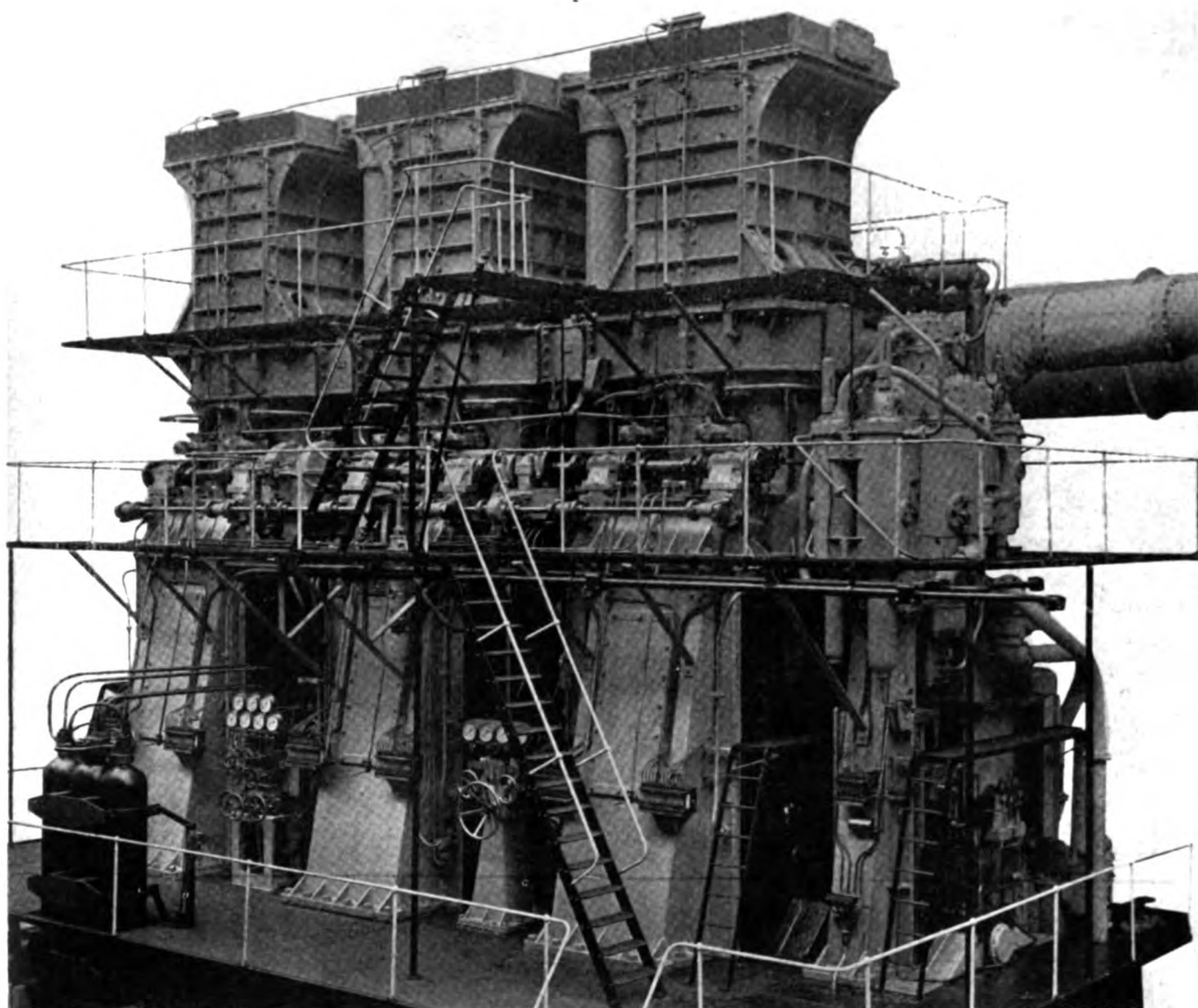


U. S. Scout Cruiser Omaha

This new 7,200-ton scout cruiser on her official trials attained a maximum speed of 35.46 knots. In a recent trial distance run from Honolulu to San Francisco, she made the best single day's run on record, covering 680 nautical miles, or 776 statute miles for an average of 28.33 knots, as against the *Mauretania's* best previous record of 676 miles in a 25-hour day for an average of 27.04 knots. The *Omaha* is 556 feet long and her Westinghouse main turbines develop 98,000 horsepower. She has a cruising radius of 10,000 miles, has 10 torpedo tubes, carries airplanes which are launched from catapults and can launch 200 mines while going at full speed. She is capable of crossing the Atlantic easily in less than four days.



Six Cylinder 3,000 Brake Horsepower Camellaird-Fullagar Engine: Bore, 23 Inches; Stroke (Combined), 72 Inches; Revolutions per Minute, 90



3,000 Brake Horsepower Camellaird-Fullagar Engine

British Yard Builds Largest Marine Diesel Engine

**Palmers Shipbuilding Company Completes Six Cylinder
Camellaird-Fullagar Opposed Piston Engine Which Develops
3,000 Brake Horsepower at 90 Revolutions Per Minute**

By Our Special London Correspondent

ALTHOUGH when the Fullagar type of opposed piston oil engine was first developed for installation in mercantile ships after the war it created an immense amount of interest, less has since been heard of it than some of the other types. Cammell Laird & Company, who have been responsible for its design for marine purposes, have constructed a few plants, but nothing above 1,000 brake horsepower. Many of the leading British marine engine builders were very favorably impressed with the design and, as a result, some of the biggest concerns such as John Brown & Company, and Palmers Shipbuilding & Iron Company, acquired licenses for its manufacture.

Palmers have now just completed their first engine and it is

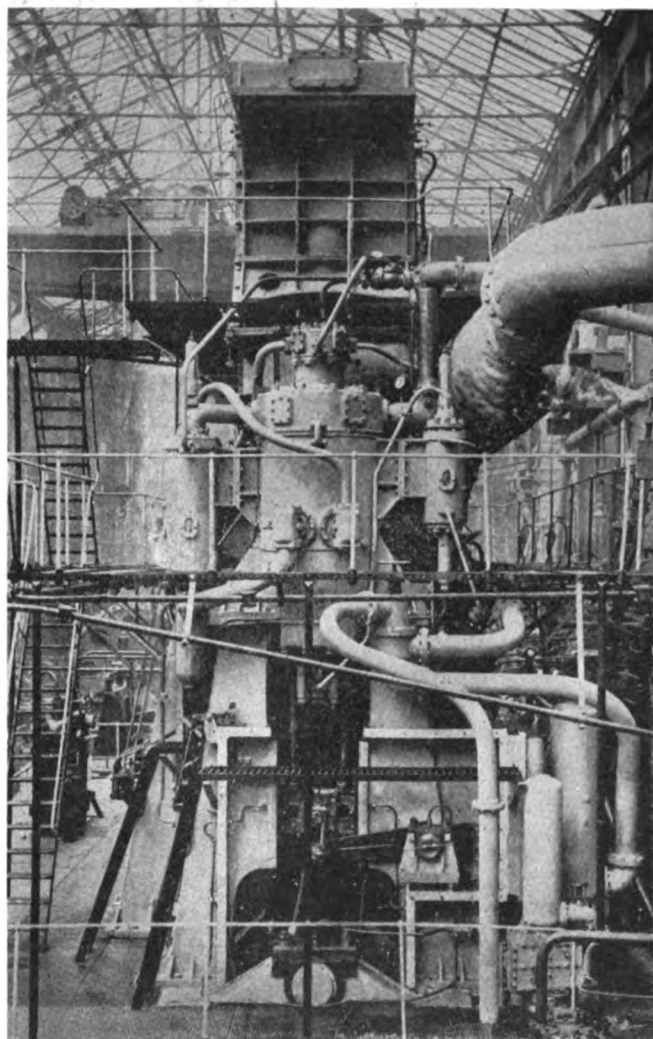
of some interest to note that it is designed for an output greater than any other engine yet installed in a ship. It will develop 3,000 brake horsepower at 90 revolutions per minute, whereas previously the record was held by the Doxford type motor, designed for about 2,900 brake horsepower at 87 revolutions per minute.

TO BE INSTALLED IN SINGLE SCREW VESSEL

The engine has a further interest in that it is intended for single screw vessels and is of a type that might prove suitable for installation in some of the larger American ships in place of the steam machinery now fitted. From the standpoint of size, it is fairly satisfactory, the length being some

37 or 38 feet, but the height is rather surprising, amounting to between 30 and 35 feet. It is of course pointed out that this matters little in a single screw vessel, but on the other hand it might prove inconvenient in twin screw craft. Bearing this in mind, the designers propose to alter the arrangement slightly for such vessels. In the engine as illustrated, the scavenging pumps are arranged at the top of the working cylinders. By doing away with these scavenging pumps and providing a separate electrically driven turbo blower as fitted on many two cycle engined motorships, the height of the engine could be reduced to a certain extent.

At first sight, it might be thought that this unit was a



End View of the 3,000 Brake Horsepower Camellaird-Fullagar Engine

three cylinder engine. Actually it has six cylinders, but as with the usual Camellaird-Fullagar design, each pair is cast together and in each cylinder there are two opposed pistons. There is thus a crosshead at the top and bottom for each cylinder, and these crossheads are connected by diagonal rods in such a way that the upper crosshead of the left hand cylinder is coupled to the lower crosshead of the right. The result of this is to produce a cushioning effect, reducing bearing pressures and having other advantages, particularly in the matter of reduction of space. The top crossheads are enclosed, thus forming the square-section scavenging pumps previously referred to, for the supply of scavenging air. This air is admitted to the cylinders through ports (uncovered by the bottom piston at the bottom of its stroke) and sweeps right through to the top of the cylinder, discharging the ex-

haust gases through exhaust ports at the top, these being in turn uncovered by the upper piston.

MAIN PARTICULARS

The cylinders have a diameter of only 23 inches, which is quite moderate, but the stroke of each piston is 36 inches, giving what is virtually a piston stroke of 6 feet. It is well known that some difficulties have been experienced with engines of this class in connection with the liners, and when it is remembered that these relatively thin liners have to be some 8 or 9 feet in length, it will be realized that the problem of preventing cylinder cracks developing is not easy of solution. In this engine the center part of the liner, wherein are located the horizontal fuel and starting air valves, is reinforced by steel bands, for this is obviously the weakest portion of the liner. The fuel bands are however so arranged that the cooling water may pass freely around them.

Apart from the question of the connection of upper and lower crossheads of adjacent cylinders as previously mentioned, this engine differs very radically from the Doxford opposed-piston type. In the latter the compression pressure is only about 300 pounds per square inch and the top parts of the pistons are uncooled so as to maintain a high temperature to assist combustion. In the Palmer engine the normal Diesel pressure of about 500 pounds is used for compression. The pistons have of course to be cooled and incidentally fresh water is utilized for this purpose as well as for the cylinders. The pistons are of somewhat novel design and the crown, in which the piston rings are arranged, is of cast steel, the skirt being of cast iron. This arrangement has occasionally been used before but it has not previously been adopted on an engine of anything approaching this size.

VALVE MECHANISM

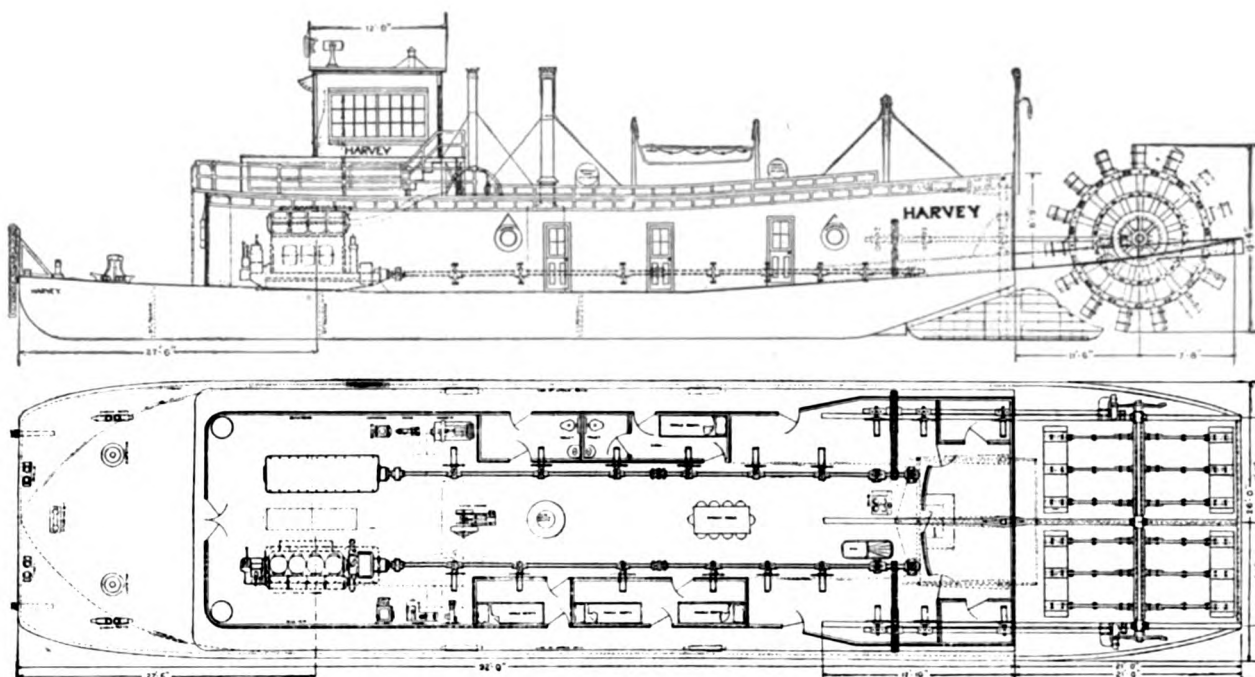
The number of valves in connection with the combustion chambers of the cylinders has been reduced to a minimum as is indeed necessary with this design. But there is only one fuel valve at the front of each cylinder and a starting air valve at the back and both of these are naturally horizontally disposed. They are actuated through the intermediary of the camshaft which is the upper and larger spindle of the two seen at the top of the engine in the illustration. On this shaft are side-by-side cams for ahead and astern running, the air starting valves at the back of the engine being actuated from these cams through the intermediary of horizontal levers extending between the cylinder blocks and at each end. The lower spindle below the camshaft is a maneuvering shaft and is brought into action on turning the large maneuvering wheel on the starting platform, seen in the center of the engine.

REVERSING SYSTEM

When this wheel is in the neutral or stop position, the camshaft is likewise so located that the two cams are in the neutral position. To go ahead the wheel is turned to the right, this operation causing the camshaft to be moved longitudinally and the ahead cams to come in the right position for operating the valve levers. A further movement of the starting wheel turns the maneuvering shaft previously referred to and this allows compressed air to enter the cylinders through the air-starting valves.

The engine then rotates and after a very short period, a further movement of the maneuvering wheel causes the air supply to be shut off, the air starting valves to be cut out of operation and the fuel pumps to deliver oil to the fuel valves. The usual arrangement is employed of first cutting the air supply off two cylinders, then off four and finally off of all six, so as to get an even start. For running in the astern direction the handwheel is merely turned to the left instead of to the right. This is a very simple control, being reduced to one wheel and on the right of this is a small handwheel

(Continued on page 242)



General Arrangement of Diesel Towboat Harvey

Reversible Diesel Engine Drives Stern Wheel Towboat

Reliable, Efficient and Economical Propulsion Secured with Reversible, Two-Cycle, Solid Injection Diesel Engines, Driving Split Stern Wheel Through Chain Sprocket and Bevel Gears

THE credit of owning and designing the first "reversing at the engine" stern wheel towboat goes to T. L. Herbert and Sons, sand and gravel contractors of Nashville, Tenn. The recent trial trip of the *Harvey*, as the boat is named, was made on a rapidly rising river with a swift current flowing, when the vessel maneuvered perfectly, picked up an empty scow, took it about 14 miles down the river and returned against the current with a loaded tow of sand.

The Herberts and their chief engineer, W. Harvey Herbert,

were very enthusiastic over the performance, for they have a steamer of about the same size and power, that, from their records, shows a consumption of 7.9 pounds of coal per horsepower hour, as compared with one-half pound of fuel oil per horsepower hour used by the Diesel engine. The daily fuel and lubricating oil bill for the steamer is \$40 per ten-hour day as compared with \$9.50 for the Diesel. The Diesel boat shows additional savings in that it requires two less in her crew than the steamboat and there is an approximate saving of 154 hours per year in fueling time. The com-



Split Stern Wheel Driven Through Bevel Gears from Line Shaft



Chain Sprocket Reduction Gear at After End of Line Shaft

pany's records show that the steam vessel requires three hours per week as against 30 minutes fueling time every three months for the Diesel. This does not include the attendant savings in labor, cost, delays lost in towing time, etc.

GENERAL DESCRIPTION

The *Harvey*, built by the Nashville Bridge Company, Nashville, Tenn., has a steel hull and a complete steel main deck with a wooden superstructure. Her bow is constructed on model rather than scow lines and she is steered by three balanced rudders 18 feet long. She is 113 feet over all, has a beam of 26 feet and a mean draft of 3 feet. Her speed light in still water is about 12½ miles. Oil fuel tanks sufficient to operate her for 120 days are located under the engine room and ballast tanks for trim are fitted forward. The cost of the boat completely equipped was approximately \$50,000.

MACHINERY INSTALLATION

The propelling machinery consists of two Worthington four-cylinder, two-cycle, solid injection, direct reversible Diesel marine engines of 120 horsepower each at 375 revolutions per minute. The entire engine unit with all essential auxiliaries is self-contained.

Line shafts run aft from each engine to a point about 10 feet forward of the stern where a sprocket wheel, having three teeth abreast, drives a triple strand, two-inch pitch roller chain. The chain, in turn, through a sprocket gear, drives a fore and aft outboard shaft at from 74 to 78 revolutions and this shaft, in turn, through bevel gears, operates the stern paddle wheel at about 19 turns per minute. The sprockets have 13 and 64 teeth and the bevel gears 17 and 67 teeth. No clutches or gear shifts are used external to the engines.

The paddle wheel is divided into two parts so that the starboard engine drives the starboard portion and the port engine the port portion. By this arrangement, efficient maneuvering can be accomplished with half the power and also, if necessary, the boat can be operated with one engine. The paddle wheel has a diameter of 15 feet 4 inches. There are 15 buckets, 8 feet 4 inches long, with a 20-inch face on each wheel.

British Yard Builds Largest Diesel Engine

(Continued from page 240)

which allows the lift of the fuel valves to be varied if the engine is desired to operate at low speed for a long time.

AIR COMPRESSOR IS OF FOUR-STAGE TYPE

At the forward end of the engine is the air compressor for the supply of injection air and this is unusual, being of the four-stage type instead of three-stage, which is the common arrangement. It is driven off an extension of the crankshaft and the main engine also drives a number of auxiliaries, including the lubricating oil pumps, as well as a piston cooling and circulating water pump. This is also a rather unusual arrangement since the general method is to employ electrical or steam-driven independent auxiliaries for this purpose.

The vessel in which this interesting engine will be installed is a tanker of 10,000 tons deadweight capacity for the British Tankers, Ltd., which is now completing at Palmers' yard. It will represent the largest single screw motor tanker in service, many previous vessels having been built with twin screw machinery of about the same power. Incidentally it may be added that John Brown and Company, Clydebank, have also built a Camellaird-Fullagar engine for installation

in a cargo ship under construction at Kawasaki but the trials upon this have not yet been concluded.

The Port of Portland

By F. M. Eastland

AT Portland, Ore., the enormous expansion of trade made imperative the construction of a fourth municipal terminal which occupies about 160 acres, including 50 acres of industrial sites where a well-balanced combination of rail and water serves such industries. At this terminal the bulk of the foreign cargoes is handled, a distance of seven miles from the center of the city's waterfront. When fully completed, about a score of vessels will find berthing space in the various slips.

Among the modern improvements at this terminal are a million-bushel capacity grain elevator; a battery of steel tanks for handling vegetable oils or other liquid cargoes; massive sheds and bulk commodity storage for handling phosphate rock, ores, coal, etc.

At this terminal, also, consisting of five piers and three slips, has been recently completed the ventilated storehouse for apples. It is 120 feet wide, 610 feet long and will accommodate a maximum of 500,000 boxes of apples. Modern machinery has been installed for the successful handling and storing of the fruit.

The port's own locomotive and equipment operate at terminal No. 4 over more than 17 miles of tracks. One of the few gigantic mechanical car-dumpers in use in the world is located here. Thirty-six regular steamship lines now serve the port where four years ago less than ten existed.

For sixty years after the first survey of the river's mouth by Admiral Vancouver, the low-water depth of the channel remained at twenty-seven feet. In 1868 the fact was disclosed that in twelve years it had lost two feet in depth. Yet this was less alarming than that in the following fourteen years it lost six feet more, being but nineteen feet at low-water depth.

The prospect of seeing the Columbia River become unnavigable in a quarter of a century or so aroused Congress to action. An appropriation was made and in 1884 work began. It was completed in eight years but was unsuccessful; that is, the jetty on the south side of the river's mouth proved inadequate to combat the rapidly growing obstruction of the channel.

With the construction of the north jetty, conditions immediately improved. For the last eight years the channel has deepened at the rate of a foot a year. The Columbia now has no bar. At the entrance is a depth of forty-three feet at extreme low tide, while the average depth at high water is over fifty feet for a width of 5,000 feet. The sum disbursed by the government for the improvement of the Columbia River ship channel to Portland will permit the widening of the channel by dredging. Its minimum width at present is three hundred feet. Widening is desirable but not imperative, as was the deepening, since ocean commerce is neither restricted nor hazardous because of the channel. The shipping companies which refused to send their vessels across the bar in 1912 are now eagerly arranging, or have already arranged, regular schedules for their boats, both freight and passenger.

Portland has the only absolutely fresh-water harbor on the Pacific shores of the United States, with perfect climatic conditions for unrestricted commerce. Commanding the gateway of the famous Columbia River Basin, a region of almost every natural resource, it has the additional advantage of a maximum of two-tenths of one percent grade for rail lines converging from the rich areas. Added to these are the growing commercial facilities which far-sighted business men are constantly demanding.

Changing a Section of the Crank Shaft in a Diesel Engine

By A. F. Menzies



IN late September the motorship *Siam*, one of the early Diesel engined vessels turned out by Burmeister and Wain, had the misfortune while off the Columbia river to break the crank shaft of her port engine. Fortunately, the engine was shut down before any further damage took place. Having twin machinery the vessel was able to make port on one leg.

The engines are of the eight cylinder type. The break occurred in the after crank web of number 6 cylinder. As is well known, the crank shafts of these engines are made up of four identical sections of two cranks each, each section being one forging. A spare section being available, the repair consisted of removing the broken shaft and replacing it with the spare section.

After competitive bids on the work had been received, the job was entrusted to the Wallace Shipbuilding and Dry Dock Company, Limited, of North Vancouver, who submitted the lowest tender and agreed, under a rather heavy penalty, to complete the work in nine running days, after the arrival of the vessel at their yard.

The procedure adopted in carrying out the repair was to raise the casing and the attached two cylinders over the damaged shaft a sufficient distance to enable the shaft to be lifted and slid out sideways into the center of the engine room.

In order to accomplish this, it was necessary to strip cylinders 5 and 6, take away three-quarters of the cam and reversing shafts and dismantle the timing gear completely, the latter being driven from a split gear mounted on the shaft coupling between cranks 4 and 5. The handling gear, fuel pumps and a quantity of piping also had to be removed. The eight large bolts which pass through the cylinder bases, the casing and the bedplate had to be let go, as well as all the casing joint bolts and studs securing the casing to the bed. The piston rods, with the connecting rods attached were hung up in the usual way.

The casing and cylinders, with pistons, rods, etc., a weight of about 26 tons, was raised by jacks and steadied by wedges and chain blocks. Great care had to be taken with this operation, as the center of gravity of the weight was well above the point of application of the jacks.

REMOVING THE SHAFT

With the casing raised, a space, the same length as the shaft and about 30 inches high was available for the removal of the shaft. The space was, however, obstructed by the blocks required to support the inboard side of the casing. By properly locating the blocks, it was possible to work the shaft out to them and then transfer them inside. The shaft was then withdrawn completely and lifted out of the engine room by means of a floating derrick.

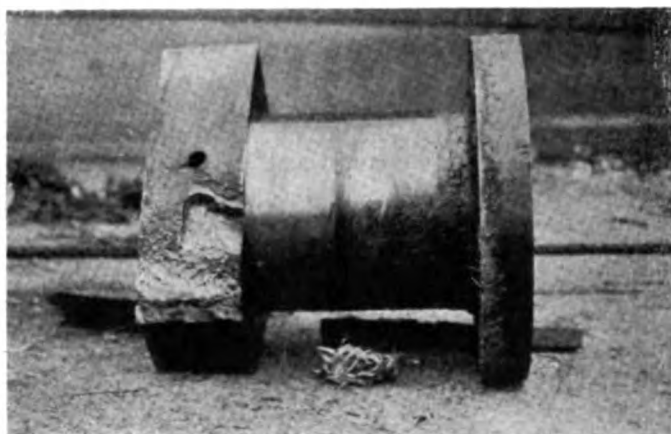
The spare shaft was stowed in one of the upper 'tween decks and it was lowered into the engineroom by the same tackle used to remove the old shaft. To get the new shaft through the space between the casings it had to be carefully lined up with them and forced through with jacks. The supporting blocks had, of course, to be transferred as mentioned above. The shaft had to be kept perfectly square

during this operation as there was no room to spare, in fact, a 0.002-inch feeler could not be entered at either end.

As soon as the shaft was bedded down and passed, the casing and attached cylinders were lowered into place. Screw jacks were found to be more satisfactory for this operation than hydraulic jacks and about four were used on each side. The last part of the lowering had, however, to be done with the hydraulic jacks inside the casing. During both the raising and lowering of the casing it was, as a matter of precaution, kept carefully blocked up with wedges, care also had to be taken that it was raised plumb.

REPAIR COMPLETED WITH VESSEL LOADING CARGO

While this work was in progress the vessel's holds had been prepared for a cargo of bulk grain and when the casing had been secured in place she was moved to the loading berth at the grain elevator, where the job was completed. The



After End of Broken Crank Shaft

coupling bolt holes were reamed and new bolts fitted, the small lathe, with which the ship was provided, was of great assistance and saved a lot of weary steps. Compressed air for driving the reamers was supplied from the yard's floating power scow which is equipped with a compressor, an electric welding outfit, several small tools and a miscellaneous assortment of useful stores. A peculiarity noticed about the original coupling bolts was that very few of them were of the same size.

While the reaming and fitting of bolts was in progress, the outside gear, cam and reverse shafts, etc., were replaced, and when the couplings were completed the timing gear was assembled. This gear is, without doubt, the most intricate part of a Diesel engine and special care was taken to see that it was put together correctly.

On completion of the job the engines were run for several hours without trouble and the ship's engineers expressed great pleasure at the manner and expedition with which the work had been carried out. Incidentally the repair was made within contract time and without the slightest delay to the loading arrangements of the vessel.

CONTRACT FOR NEW PASSENGER STEAMER.—As this issue goes to press, it is learned unofficially that the Pusey & Jones Company, Wilmington, Del., was the low bidder and has been awarded the contract for the construction of the new passenger steamer for the Norfolk & Washington Steamship Company, Washington, D. C., at an approximate total cost of \$750,000. The new steamer will have an overall length of 305 feet 8 inches, beam 42 feet 5 inches, molded depth 18 feet and will be driven by triple expansion engines, steam being supplied by four Scotch boilers burning coal for fuel. She will carry between 300 and 350 passengers.

Tests on a Cylindrical Marine Boiler With and Without Preheated Air*

By W. H. Owen

The tests of which an account is given in this paper were taken with the object of ascertaining what economical results were to be expected from a marine boiler of the cylindrical type when the air for combustion was preheated, by a new form of heater, to a degree much higher than had been possible with the type of apparatus hitherto used, and to compare this efficiency with that obtained with natural draft.

TWO series of trials were made. The first was intended to ascertain the efficiencies with coal, and with natural draft. The second was of a somewhat special character for the purpose of obtaining information upon definite points, such as the variation of the efficiency with the amount of air admitted per pound of fuel, and the effect of shortening the tubular heating surface at the smokebox end with the view of the possible cheapening and lightening of the cylindrical type of marine boiler. The opportunity was taken of making ordinary efficiency tests at about full load. These trials were made with oil as fuel.

The oil- and water-measuring apparatus consisted of a weighing tank for the oil, and volumetric measuring tanks for the water. The usual air-pressure and temperature observations were taken, ordinary U-tubes being used for the former except for the more important positions where the more sensitive inclined gage was employed. For the temperatures, ordinary mercury thermometers were used except for the gas temperatures before and after the heater, where mercurial pyrometers were used.

OIL-FUEL PLANT

The oil-fuel plant was of the standard Wallsend-Howden type. The steam made in the boiler was allowed to escape to the atmosphere through the safety valves, the pressure being kept nearly constant by manipulating the easing gear when necessary. The oil used during the tests was of Shell-Mex quality. The coal was supplied by the Polmaise Navigation Company, Stirling, and was of good steam quality, not specially selected.

During the coal trials the fuel was fired at a constant rate, the time interval between successive charges in each furnace being ten minutes. The fires were cleaned a short time before the trial and brought to uniform condition of about 5 inches thickness. This was measured by a special notched gaging-tool. As soon as the fires were found to be in good condition and satisfactory with regard to depth, the readings were commenced. The gross calorific values of the coal were subsequently determined by means of a Berthelot-Mahler bomb calorimeter, and the net values were calculated in accordance with the method laid down in the standard test rules of the Institution of Civil Engineers.

Net calorific value =
Gross value—1,055 × (moisture, lbs. — 9 H.lb.)

TEST BOILER AND AIR PREHEATER

A general arrangement of the test boiler and air preheater is shown in Fig. 1. The boiler upon which the tests were made is of the cylindrical marine type with two furnaces. The particulars of the boiler are given below:

Single-ended boiler.
External diameter, 9 feet 6 inches.
Length overall, 11 feet.
Number of furnaces, 2.

*Abstract of paper read before the Institution of Engineers and Shipbuilders in Scotland, February 12, 1924.

Diameter of furnaces, 2 feet 7 $\frac{3}{8}$ inches inside corrugations.
Firebars, 4 feet 6 inches long.
Tubes, 2 $\frac{1}{2}$ inches external diameter, 7 feet 6 inches long.
Number of tubes, 146, all fitted with retarders.
Diameter of chimney, 3 feet.
Height of chimney, 54 feet 2 inches above bars.
Heating surface—

	Coal burning. Square feet.	Oil burning. Square feet.
Tubes	716.13	716.13
Furnaces	80.5	182.97
Combustion chamber	113.37	137.50
Total	910	1,036.6
		Cubic feet.
Volume of combustion chambers		84.86
Volume of furnaces		80.00
Total		164.86

	Cubic feet.	Square feet.
Capacity water space ..	393	Area water surface .. 84
Capacity steam space ..	118	

The type of preheater used in the tests represents the latest development of this form of heat-recovery apparatus, and is shown in Fig. 1. In ordinary types of air heater the gases and the air traverse opposite faces of a dividing wall, so that the heat is transmitted by conduction from the gases to the air. In the Howden-Ljungström type, heat is being stored on the regenerative principle in one part of the apparatus, while heat previously stored is being given up to the air in the other, the air and gases traversing alternately the same identical surfaces.

The principle is not new, and is familiar to metallurgical engineers in the form of brickwork regenerators. In that form the action is intermittent, but in the Howden-Ljungström form, the process is made continuous by assembling the regenerator material in a rotating part, in such a way that it passes alternately through the waste gas and the air currents, absorbing heat from the gases and restoring heat to the air.

HEAT REGENERATIVE PROCESS

The gases and the air traverse the surfaces of the material in the rotor in opposite axial directions, so that the exchange of heat is performed during a counter-current process, thus giving a high regenerative efficiency. The regenerative elements as built up in the rotor, consist of a large number of thin corrugated plates about $\frac{1}{2}$ millimeters in thickness. The corrugated plates are held between flat plates of the same thickness so that very small triangular passages are formed, and the plates are disposed in the rotor in such a way that the direction of the passages is parallel with the axis of the rotor. In this manner it is possible to provide, within a comparatively small space, a very large surface which varies from four to six times the boiler-heating surface according to circumstances, and enables the temperature of the exit

gases to be lowered to a degree not practicable with the ordinary type of heater, except at a very great increase in both cost and weight.

Referring to Fig. 1, it will be seen that the cylindrical casing is divided into three parts. The rotor is divided into several sectors by radial ribs, and the elements are disposed circumferentially in these sectors. Round the exterior of the rotor is a machined steel-ring, the underside of which rests upon three steel rollers of disk form which are carried by ball-bearings fixed in the brackets shown. The spindle of one of these disks projects through the bearing bracket, and carries a wheel driven by a chain and spur gear from the fan shaft above. The rotor is driven round by frictional contact with the disk, the power required being almost negligible. The top section of the casing contains two fans which have the advantage of forming an integral part of the structure. These fans are of the propeller type and are exceedingly simple in construction. The cold air enters through the fan on the right and the gases are extracted by the fan on the left. The spaces in which the fans work are divided from

each other by partitions, as in the lowest section. There is, of course, a slight leakage of air from the air side to the gas side in both top and bottom sections, but effective means are taken to make this leakage practically negligible.

By using two fans, moderate pressures only are required, and their proximity to the heater and to the boiler ensures

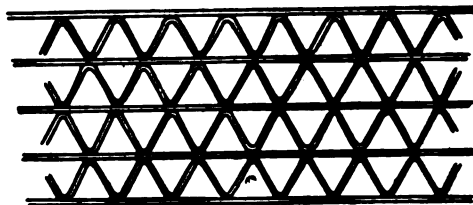


Fig. 2.—Cellular Portion of Heating Plates

that there is practically no loss of pressure in transmission, so that it is found possible to burn over 30 pounds of coal per square foot of grate per hour with an air pressure of one inch only above the rotor. A simple and a thoroughly effective soot-blowing device keeps the surface of the elements in a perfectly clean condition and ensures the efficiency of heat transference being maintained. Fig. 2 illustrates the cellular component of the heating plates.

Table I gives the leading particulars of a number of tests with both coal and oil, with and without preheated air.

TEST NO. 1 SHOWS 89.7 PERCENT EFFICIENCY

Test No. 1 was made with oil, preheated air, and forced draft, at a rate of evaporation, from and at 6.98 pounds of

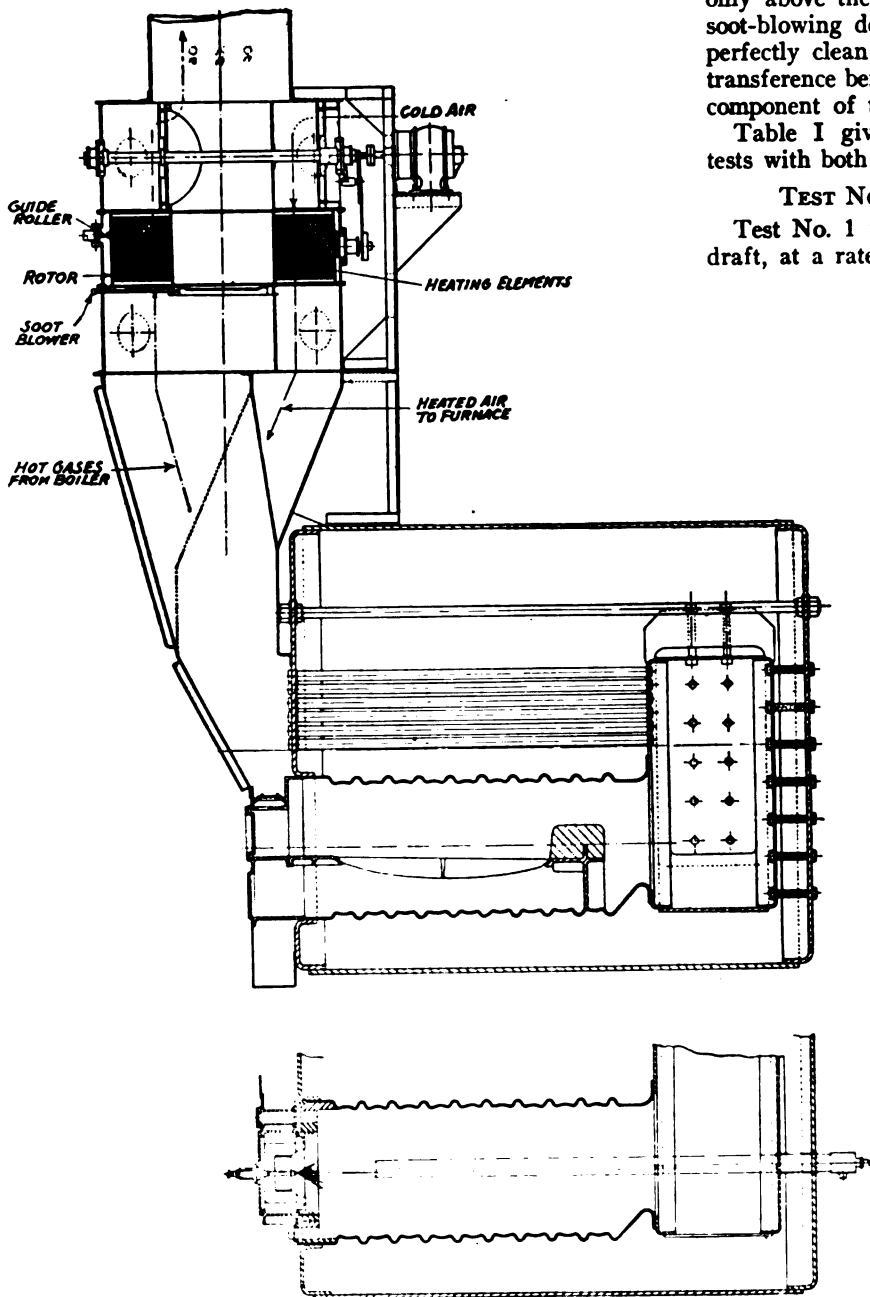


Fig. 1.—Scotch Boiler Fitted with Howden-Ljungström Air Preheater

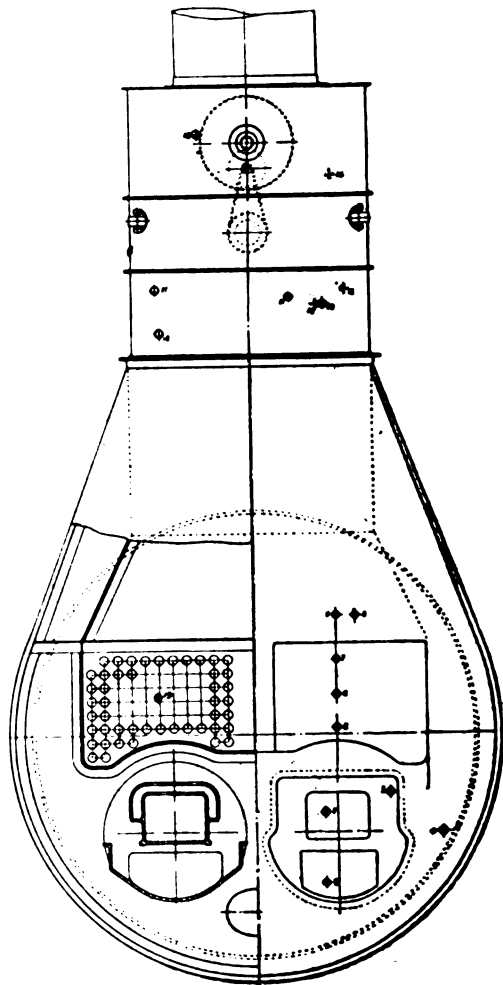


TABLE I—PRINCIPAL RESULTS DEDUCED FROM THE TESTS

1. Test No.	1	2	3	4	5	6	7
2. Duration in hours	4	4	2 hr. 57 min.	2	3	4	5
3. Condition of air	Preheated	Preheated	Preheated	Preheated	Preheated	Preheated	Nat. draft
4. Fuel	Oil	Oil	Oil	Oil	Oil	Coal	Coal
5. Steam pressure, pounds per square inch, gage	186	186.5	186.3	186	184.1	185	180
6. Quality of steam (dryness)	0.984	0.986	0.985	0.987	0.987	0.979	0.979
7. Fuel consumption, pounds per hour	454.75	455.5	436.9	437	426	632	440
8. Net calorific value, B.T.U.'s	17,415	17,480	17,480	17,502	17,433	13,228	14,201
9. Water evaporated, pounds per hour	6,703	6,565	6,359.3	6,382.5	6,123.3	6,982	3,914.4
10. Water evaporated, pounds per hour, per pound of fuel	14.74	14.41	14.55	14.60	14.37	11	8.89
11. Water evaporated, pounds per hour per square foot of heating surface	6.4	7.77	6.14	6.16	5.91	7.67	4.3
12. Air pressure at boiler front, inches of water	.18	.60	1.0	.58	2.5	.33	..
13. Air temperature at boiler front, degrees F.	435	463	491	447	450	436	..
14. Gas temperature chimney base, degrees F.	209	204	212	200	217	232	536
15. CO ₂ in flue gases (smoke-box) percent	13.63	14.1	11.7	12.56	8.19	13.0	10.0
16. Boiler efficiency percent	89.7	87.0	88.2	88.5	87.4	88.1	66.17

water per square foot of heating surface per hour. The efficiency obtained was 89.7 percent.

Fig. 3 shows the variation of feed and oil, and Fig. 4 the variation in efficiency. Fig. 5 gives the relation of the evaporation to the oil burned, the position of the points at the end of each of the four hours, with regard to the inclined line drawn through the origin, indicating a satisfactory regularity. The efficiency obtained is exceedingly high, but there should be little difficulty in obtaining and maintaining this figure at sea with the Howden-Ljungström air pre-heater, assuming very ordinary skilled supervision, and the exercise of due care with regard to the cleanness of the oil strainers and burners, and to what is of primary importance, the temperature of the oil before spraying. For every class of oil there is a temperature at which the best results are obtained, and with some kinds, a slight departure either way will have a quite important adverse effect upon efficiency. Fig. 6 shows the variation of the steam pressure, feed temperature, and air temperature during the test No. 1.

It is well known that the evaporation from the tubes of locomotive and marine boilers, per unit heating surface, falls

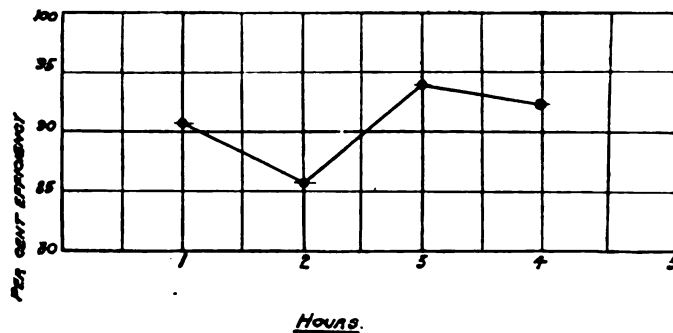


Fig. 4.—Chart Showing Variation in Efficiency

off rapidly as the smokebox end is approached. Experiments made in France, about two generations ago, on a modified boiler of the locomotive type, yielded exact figures, and showed that the first foot of the tubes from the firebox end gave a large percentage of the total evaporation from the tubular heating surface.

No such experiments have, apparently, been made on a marine boiler of the cylindrical type, probably because that

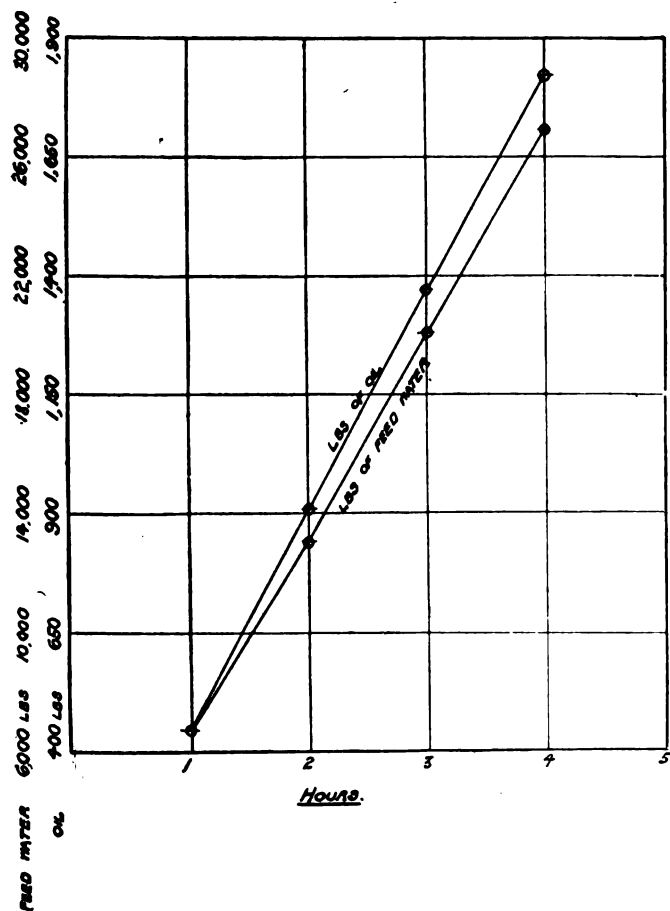


Fig. 3.—Chart Showing Variation of Feed Water and Oil

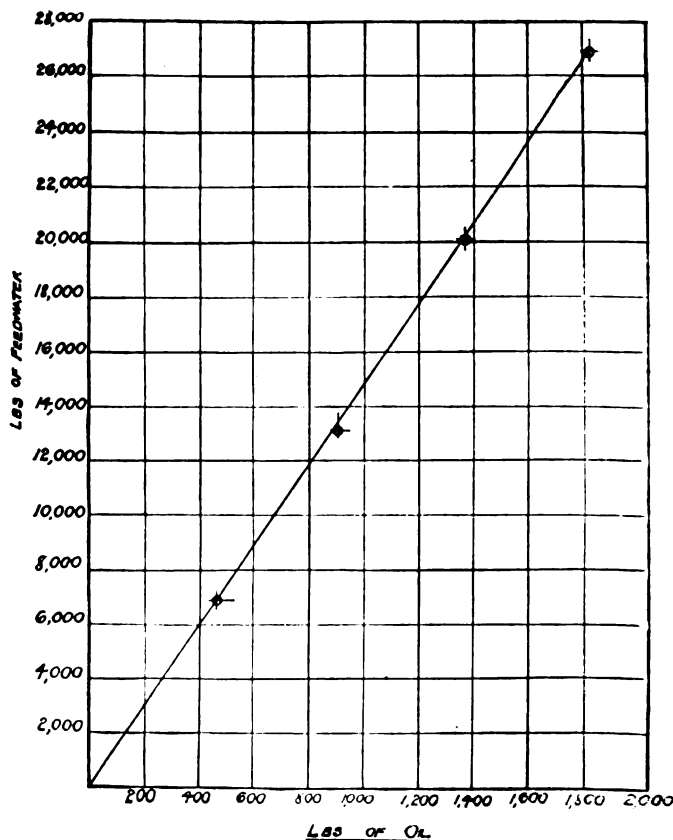


Fig. 5.—Chart Giving Relation of Evaporation to Oil Burned

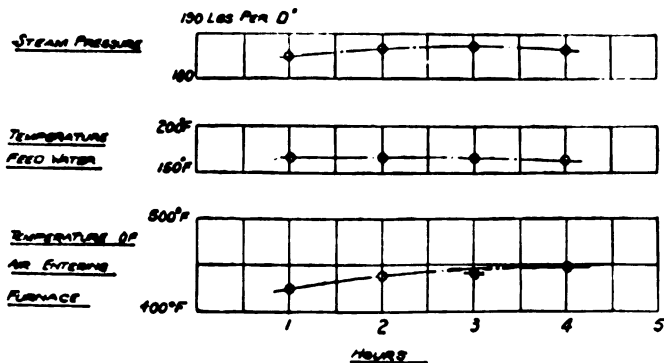


Fig. 6.—Variations During Test No. 1

type does not lend itself readily to modification. I thought, however, that it would be interesting to observe in conjunction with the preheater, how the efficiency would be affected by blinding off a certain length of the tubes from the smokebox end, by inserting an insulating tube in each of the smoke-tubes.

After consideration it was decided that asbestos would be the best material to use, and tubes of different external diameters were obtained for the ordinary tubes and the stay tubes. The thickness of the asbestos tubes was about $\frac{1}{8}$ inch and their external diameter was such that a small annular insulating-space was left. This space was packed at the

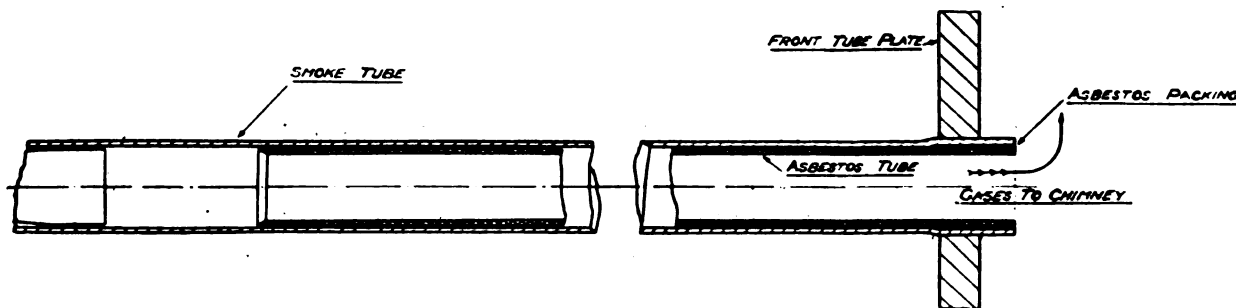


Fig. 7.—Method of Blanking Off Portion of Boiler Tube with Asbestos Tube

smokebox end with an asbestos grummet, in order to prevent any flow of gas between the smoke-tubes and the insulating tubes, the whole of the gas passing through the asbestos tubes. In this way the effective length of the boiler tubes was shortened from 7 feet 6 inches to 5 feet 6 inches, the retarders being shortened to suit. This arrangement is shown in Fig. 7. A four hours' test was then made, burning practically the same quantity of oil as in test No. 1. The leading particulars of this test are given in Table I, from which it will be seen that an efficiency of 87 percent was obtained. Under the circumstances this may be suggested as a satisfactorily high figure. The equivalent evaporation per square foot of heating surface was 8.4 pounds. It will be noticed that the temperature of the air at the furnaces was 463 degrees F., compared with 435 degrees F. in test No. 1. Probably the combustion might have been improved, with a corresponding improvement in the efficiency of say 1 percent. The deduction to be drawn from this experiment is that, with an efficient preheater a considerable saving in weight could be made in the heavy-pressure parts of the boiler plant.

Tests Nos. 3, 4 and 5, Table I, were taken with the object of ascertaining what variation in efficiency would be caused by varying the amount of air, the quantity of oil burned per hour remaining practically constant. A special fan was installed to give the high pressure required.

RESULTS OF TESTS SHOWING VARIATION IN EFFICIENCY

These results are indicated on the curve shown in Fig. 8. The point relating to test No. 1 with 13.63 percent CO_2 and

89.7 percent efficiency is also given. It will be seen that the efficiency throughout the range varies very slightly.

These results indicate that with suitable proportions for the air supply and the air highly preheated, it is impossible to obtain a low efficiency by carelessness in admitting too much air to the furnaces. On the other hand if too little air be admitted any low efficiency figure might be obtained, accompanied possibly by after combustion in the smokebox.

Test No. 6 was taken at an evaporation of 6,982 pounds per hour, when burning coal at the rate of 26.3 pounds per square foot of grate with preheated air, the efficiency obtained being 88.1 percent. Test No. 7 was taken when evaporating 3,914 pounds per hour at a rate of 18.3 pounds per square foot of grate with natural draft. An efficiency of 66.17 percent was obtained, the quality of coal being higher than that used with the hot-air test. The efficiency obtained is 21.93 percent lower than the efficiency with preheated air and a poorer grade of fuel. Forced draft combined with preheated air can thus account for a saving in fuel of 25 percent, accompanied, of course, by a much increased output.

Some general remarks with regard to the effect of highly preheated air and forced draft upon combustion may be of interest.

EFFECT OF HIGHLY PREHEATED AIR AND FORCED DRAFT UPON COMBUSTION

Observations through the sight holes at the back of the test boiler when oil and various classes of coal were being

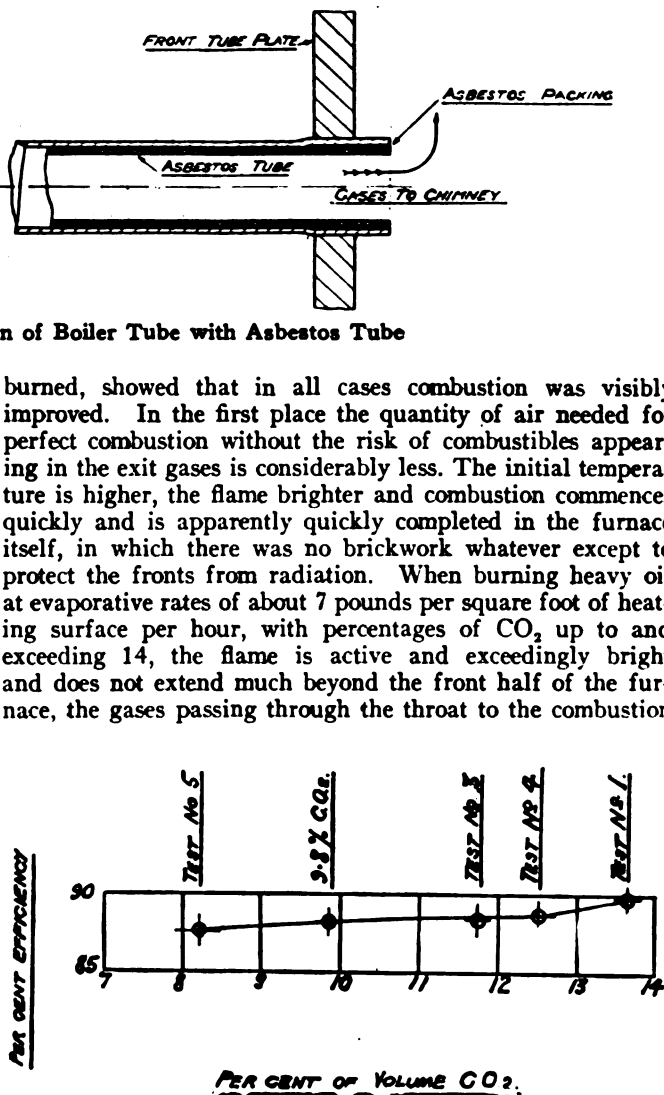


Fig. 8.—Results of Tests Showing Variation in Efficiency

chamber consisting apparently of nothing but inert products with very little trace of smoke, having lost nearly all luminosity owing to the rapid fall in temperature.

There can be little doubt that a very large portion of the total evaporation is performed in the furnaces by radiation and direct contact.

With coal, precisely the same effects were seen. Even with poor qualities of 8,500 to 9,000 British thermal units having a large ash content, burned at the rate of 30 pounds per square foot of grate surface per hour, the flame in the furnace was nearly white and quite as bright as that seen when burning oil and without any trace of smoke except for a few seconds immediately after firing.

When burning oil or coal with natural draft the contrast is most marked. It is necessary to admit a considerable excess of air, and to work at a comparatively low CO₂ percentage, if much smoke is to be avoided, with a consequence that the initial temperature is lowered, and the efficiency is reduced by large quantities of heat being carried away, by the excess of air necessary to avoid incomplete combustion.

It is quite certain that for all classes of fuel the combination of forced draft with highly preheated air has a most beneficial effect upon the complex process of combustion, and that by its use both increased output and improved efficiency can be obtained together.

FUTURE DEVELOPMENTS

A word may be said with regard to future developments. At the moment it would seem that they must be on the lines

of the latest land practice that is in the direction of higher boiler pressures, lighter boilers and the application of the principle of reversible feed-heating in series, by steam drawn from several stages of the turbine. By these methods not only would the quantity of steam per shaft horsepower be less, requiring fewer boilers, but the boilers themselves would weigh less than cylindrical boilers and the total weight would be reduced considerably, a factor of no inconsiderable importance in a modern steamship.

By increasing the pressure to 300 pounds per square inch the overall thermal efficiency, with full reversible feed-heating, a boiler efficiency of 90 percent, and turbine and gearing efficiency of 81.25 percent, would be 34.56 percent and a shaft horsepower would be obtained for .515 pound of oil. With 550 pounds steam pressure, only 47 pounds of oil would be required, and if the pressure were increased still further to 1,500 pounds per square inch, the oil consumption would fall to .407 pound per hour per shaft horsepower. These figures would, in practice, be modified according to the extent that reversible feed heating could be applied.

Saturated steam is assumed in all cases. It will be observed that the gain increases slowly in the region of the highest pressures, but that considerable economies may be effected by very moderate departures from existing practice by carrying out, as far as practicable, the principle of reversible feed heating by the turbine, combined, with the high boiler efficiency made possible by the use of highly preheated air.

Lloyd's Underwriters Offer "Time-Penalty" Insurance

Lake Hull Coverage Unprofitable—Loss When Collision Causes Delay—Harter Act Committee Appointed—Japan Coverage Defined

By "Bordereaux"

MR. SYDNEY BOULTON, one of the greatest living English authorities on marine insurance, recently made the interesting observation that the art of underwriting lies "in being able to form a sound judgment on insufficient premises." This is being tried out in England at the present time by underwriters at Lloyd's in undertaking to launch a new coverage known as "time-penalty" insurance. Few policies have as yet been issued, but it is believed that their number will rapidly increase as the idea makes headway.

This form of protection is designed to indemnify the insured against loss sustained due to the non-arrival of a steamer at a certain port—usually the loading port—on or before a certain date, by reason of a marine or war peril or the breakdown of the vessel. On account of the many factors, known and unknown, that have to be taken into consideration, the determining of an adequate rate for these risks calls for the greatest skill.

By way of illustration, coverage of this character was recently made on a steamer which sailed from Dairen for Vancouver. The insurance was placed "to pay on a total loss in the event of the non-arrival of the steamer on or before" a stated date; the fixing of this latter date allowed for thirty-three days for the voyage across the Pacific, which is approximately 5,300 miles. In estimating the chances of arrival, both in "time-penalty" and overdue insurance, underwriters base their conclusions, in the main, upon a comparison of the time the same vessel has taken on other voyages

as well as the time other vessels have taken on the voyage to be insured. It was found, in the case of the vessel under consideration, that previously she had made the voyage from Wales to Rio Janeiro in twenty-six days, which is approximately the same distance as the proposed Pacific trip; one consideration was that it should be a summer voyage in an easy trade. The risk was accepted at 3 percent, the odds being 33 to 1 against; remembering that the "time-penalty" is immaterial unless the vessel is delayed by a peril of the sea or a breakdown.

Lake Hull Coverage

ON April 15 navigation on the Great Lakes opens, but for a month past brokers have been besieging underwriters with their hull business, anxious to learn whether rates and conditions are to prevail for this season on a basis similar to those of last. It may be said that little difference will be seen. The usual clamor of the broker for a lower rate is being met by the underwriter with eloquent figures that prove how little profit, if any, can be expected unless more rate is had. There was some profit in insuring cargo on the lakes last year, but many underwriting offices scored substantial loss on hull coverage. And the season of 1921-22 was even less profitable to them than that of 1922-23. Various shipping agencies have been circulating attractive statements about profitable underwriting on the lakes last

season, but they did not admit, as should have been done, that this did not apply to hull coverage.

In point of fact, no less than fifteen vessels were wiped out on the lakes last season. Three large steel freighters became total losses: The *E. U. Demmer*, 6,800 tons, sunk in collision on Lake Huron; the *Huronton*, 3,200 tons, sent to the bottom of Lake Superior; and the *Glenstriven*, 3,200 tons, stranded in Georgian Bay. The latter, which was formerly the *America*, went ashore en route to Midland with grain, was abandoned to the underwriters by the owners as a constructive total loss and, although she was released, she is still in bad shape.

Twelve other carriers were lost, as follows: *Pere Marquette No. 4*, 940 tons, on Lake Michigan; *W. J. Carter*, 400 tons, on Lake Ontario; *Aztec*, 1,100 tons, on Lake Huron; *Wesee*, 3,200 tons, on Lake Erie; *Linden*, 1,500 tons, on Lake Huron; *J. P. Donaldson*, 150 tons, on Lake Superior; *George W. Packer*, 750 tons, in the Detroit River; *J. W. Follette*, 1,530 tons, on Lake Ontario; *Compton*, 2,100 tons, in the St. Lawrence; *Birch Bay*, 1,140 tons, in the St. Lawrence; *Jamieson*, a 275-ton barge, on Lake Ontario; and *Brookdale*, a 1,165-ton barge, at Montreal. The *Wesee* and the *Linden* were destroyed by fire. It is also well not to forget that when the *W. B. Schiller* and the *Horace S. Wilkinson* collided above Point Iroquois on June 3 last, a heavy loss was sustained by the underwriters. The *Schiller* was sunk and had to spend three months in a shipyard with consequent heavy bills for wrecking and repairs.

Harter Act Committee Appointed

PURSUANT to a decision of the American Institute of Marine Underwriters arrived at a short time ago, a committee has been appointed to take under consideration the new bill introduced in the House by Representative George W. Edmonds, and now before the Committee on Merchant Marine and Fisheries. This committee is composed of G. B. Ogden, chairman; H. E. Reed, W. D. Winter, S. D. McComb and J. F. Johnston. These gentlemen will consult with counsel and report their conclusions. It is distinctly understood that at the present time the Institute does not commit itself to any position in the matter. The Edmonds bill has been devised to bring our law into concert with the provisions of the "Carriage-of-Goods-by-Sea" proposals adopted at the international conference at Brussels, at which the United States was represented. This would mean a modification of the Harter Act. England has legislation of this character before Parliament, and it is expected that all nations represented at Brussels will incorporate into their laws the ideas endorsed by their delegates at that conference. Numerous hearings will doubtless be held in the near future by the Congressional committee that has the Edmonds bill in hand, and it is certain that the underwriters will be ably represented at most of them by officials capable of protecting their interests.

Loss When Collision Causes Delay

A PET theory of many loss men and underwriters was upset by a recent decision of Justice Rich in the New York Appellate Division. The circumstances were as follows: The *Corsicana*, carrying a shipment of potatoes, was the property of the plaintiff and was insured by the defendant insurance company. While on a voyage from New York to Caibarien, Cuba, she struck a submerged object and was obliged to put into Charleston, S. C. While there, the potatoes, although not injured directly in the collision, or touched by sea water, had to be sold on account of sprouting and rot. The shipment was covered by a policy which read,

"covering perils of the sea, fires, pirates, etc.," in the usual marine form.

In the judgment of the court the efficient dominant cause of the loss was the sea peril, and the plaintiffs were given a verdict. It has been decided over and over that a mere delay resulting in damage from deterioration is not the basis for a claim against the insurer; so that the important feature in this case was that the delay was caused by a collision, a peril insured against. And yet, if this had been a shipment of, say, dry goods, no damage would have resulted from the casualty; so that the decision in reality serves to broaden the underwriters' coverage by including the risk of loss and/or damage caused by inherent vice. Beyond question, no underwriter ever intends his protection to be extended to such a degree. However, the question is now settled, so far as New York is concerned, and underwriters may find it necessary to amend the memorandum clause of the marine policy in order to meet the situation.

Japan Coverage Defined

IMPORTANT action has been taken by American Underwriters with respect to their coverage of goods discharged from ocean steamers at Japanese ports. It has been learned from their special representatives on the ground that conditions at Yokohama and Tokio are much worse than had been thought, and that shipments are piling into those ports in amounts far exceeding what had been anticipated. A point has been reached where it became imperative that underwriters definitely define the extent of the coverage for which they assume liability. To this end the American Institute of Marine Underwriters appointed a special committee to review the subject and report back recommendations at once. This committee was composed of W. J. Roberts, chairman; H. E. Manee, T. J. Allen, C. L. Goldby and J. F. Purcell. It lost no time in going over the subject thoroughly, and making its report; with the result that the Institute has adopted the following ideas as a tentative basis for action by the individual companies:

(1) The underwriters agree, for an additional premium, to hold their assured covered on shipments discharged outside the breakwaters at Japanese ports.

(2) For additional premium, to be arranged, the underwriters offer to hold their assured covered for a certain number of days, as long as the goods are not yet delivered to the consignees or to the warehouses.

The insurance companies promptly advised their assured of these conclusions and notice was telegraphed their representatives in other parts of the United States and Canada in order that uniform action might be taken.

It is now admitted by underwriters that losses at Japanese ports, in consequence of the earthquake and fire of last September, will undoubtedly be much greater than has been anticipated. There are practically no adequate shelters at Yokohama or Tokio, and merchandise in the makeshift warehouses is little better cared for than if it were in the open. The wharves are heaped with goods that are utterly unprotected, and they lie there subject to wholesale theft and pilferage, not to mention the very grave likelihood of their being destroyed by wind or fire or sea. Japan has stood in dire need of supplies for reconstruction purposes, but it can not take care of a fraction of what is pouring in upon her from exporters who appear to have given little thought to what might happen to their goods once they reached their destination.

LOW BIDDER FOR STEEL SCOWS.—With a price of \$300,000, the Newport News Shipbuilding & Dry Dock Company has submitted the lowest bid for the construction of three 1,000-yard steel dump scows for the Panama Canal.

Questions and Answers Relating to Naval Architecture and Marine Engineering

Conducted by James L. Bates, Naval Architect, and W. B. Newton, Marine Engineer

This department is maintained for the purpose of answering all questions relating to ships and their machinery. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Effect of Current on Speed of Vessel Through Water

Q. (1,254).—Does a ship going against the current make the same speed through the water as when going with the current?

A. (1,254).—Ignoring the effect of such factors as adverse winds or waves, and assuming a clean bottom and properly operated machinery, a vessel makes a certain fixed speed (through the water) for a given number of revolutions of the propellers. Her speed "over the ground" is affected by tide or current by an amount equal to the velocity of the tide or current but her speed through the water is not affected.

Pressure of Water on Bottom of Vessel

Q. (1,240).—What is the pressure exerted by sea water (per square inch) against the shell of a ship at varying drafts up to 20 feet. What is the pressure on her keel plates when drawing 20 feet and is the pressure on her keel greater than that near her bilge?

A. (1,240).—The pressure of a liquid upon a submerged surface is equal to the weight of a column of the liquid having the area of the surface for its base, and the depth of the center of gravity of the given surface below the surface of the liquid for its height.

This law is independent of the character or location of the surface, i. e., it may be horizontal, inclined, vertical, curved or plain.

The pressure in pounds per square inch upon a submerged surface = $12 H W$, where H is the distance of the center of gravity of the surface below the surface of the liquid and W is the unit weight of the liquid in pounds. In this case, assuming sea water at 64 pounds per cubic foot, it would weigh about .037 pound per cubic inch.

Then the pressure per square inch one foot below the surface of the water is

$$\begin{aligned} &12 \times .037 = .444 \text{ pound} \\ \text{Two feet below } &2 \times 12 \times .037 = .888 \text{ pound} \\ \text{Twenty feet below } &20 \times 12 \times .037 = 8.88 \text{ pounds} \end{aligned}$$

If the ship's bottom be flat (without dead rise) and if the vessel is on an even keel, the pressure per square inch over her entire bottom is constant, viz. 8.88 pounds per square inch at twenty feet draft.

Rivet Spacings for Watertight Boundary Angles

Q. (1,244).—For what reasons do the various societies give different rivet spacings through the bulkhead and shell flanges of watertight bulkhead boundary angles?—R. L. R.

A. (1,244).—The reason, or at least the principal reason, for the difference you mention lies in the effort to avoid too great a reduction in the intact area of the shell plating and its effect on the longitudinal strength of the hull.

Rivet spacing for watertight work is not a definitely fixed quantity, 5 diameters or less being generally regarded as

satisfactory. One-seventh of the cross sectional area of the shell is punched away in a transverse section through a non-watertight frame line, consequently at a watertight bulkhead even with a rivet spacing of 5 diameters the strength is reduced $6\frac{1}{3}$ percent below that at a non-watertight frame. To adopt the same spacing as for seams and butts, viz., $4\frac{1}{2}$ diameters, would further reduce the strength by about 2.6 percent.

The shell flange of the bounding bar is afforded greater rigidity and ease in calking by virtue of the greater thickness and continuity of the shell plating thereby justifying the greater pitch of rivets.

Relations Between Plating and Connecting Angles

Q. (1,241).—What considerations determine the relations between plating and connecting angles?

A. (1,241).—The thickness of the plate determines the thickness of the angle flanges.

Where the plates to be connected are of the same thickness it is practice to use an angle having flanges of the same thickness as that of the plate.

Where the plates differ in thickness by a considerable amount, the thinner plate governs the thickness of the angle flanges.

The width of the angle flanges is fixed by the riveting required. When a light angle is attached to a heavier plate, the flange involved is made to suit a rivet $\frac{1}{8}$ inch less in diameter than required by the rules for the plate.

Noiseless Exhaust of Diesel Engines

Q. (1,252).—How is the exhaust from Diesel engines in small passenger vessels made noiseless?—J. J. W.

A. (1,252).—It is assumed your question refers to a device similar to the Maxim silencer manufactured by the Maxim Silencer Company of Hartford, Conn.

Briefly it may be described as consisting of two steel plate or cast iron heads, a steel boiler plate or cast iron cylindrical shell and cast iron silencing units made in the form of a scroll. The scrolls are attached to the rear head and are removed with it, thus affording easy inspection and cleaning. The exhaust gases enter at the center of the front head and are expanded in the body of the cylinder. They then move toward the back and enter the scrolls at their circumference, passing inwardly through the scroll passage to its center from which the gas exhausts at the center of the back head to the atmosphere.

The function of the scrolls is to convert the uneven pulsations of engine to an even flow to the air.

Where weight is paramount the heads and shell of steel are preferable but for long life the all cast iron silencer would have the advantage due to the fact that the sulphur contained in fuel oil has but slight deteriorating effect on cast iron.

It is claimed by the manufacturers that their silencer will eliminate better than 95 percent of the noise from a two or four cycle Diesel engine exhaust with a back pressure of less than 3 inches of water.

NEW BOOKS

THE LIFE OF SIR WILLIAM WHITE. By Frederick Manning.
Size, 6½ by 9¼ inches. Pages 502. Illustrations, 12. New
York, 1923: E. P. Dutton & Company.

Seldom has a book appeared of greater interest to naval architects, particularly those whose professional experience extends back over a period of twenty-five or thirty years, than the life of Sir William White.

Entering the active practice of his profession when iron was but commencing to replace wood, and steam propulsion was still in the nature of an auxiliary, Sir William's last active association with ship design was as principal adviser in the construction of the *Lusitania* and *Mauretania*, in their way, perhaps, the most remarkable vessels ever built and whose design represented a degree of professional skill which can be fully appreciated only by the trained engineer and constructor.

White became Director of Naval Construction in 1885. He found the British Navy strong in numbers but otherwise deficient, a mixed collection of more or less experimental designs. The Royal Dock Yards were reported as capable of undertaking repair work only and with the British public the impression was gaining ground that all was not well with the Navy.

Public mistrust, together with the efforts of the most logical and able minds at the Admiralty brought about the Naval Defense Act of 1889 with its enormous and extended program of new construction. For the tremendous responsibility involved in the design of the many and varied vessels of this new fleet, White was peculiarly fitted. Undoubtedly the greatest naval architect of his day, he possessed not only the very highest technical and scientific skill, but a mind singularly broad and clear, indomitable courage and persistence and a quiet but determined confidence in himself. He was by some accused of egotism—it was rather the confidence born of long experience and careful, analytical thought and study.

After the completion of the Naval Defense program, White designed many notable vessels, and in the *King Edward VII* brought the "two-caliber" ship to its highest state of perfection. He was an advocate of this class of vessel, as opposed to the "all-big-gun" or *Dreadnaught* type and, although subsequent experience proved pretty conclusively that in this his judgment was in error and that in modern fleet actions the small guns have a very minor part, he was by no means alone in the position which he took and had the support of a very large school of naval thought.

It was the irony of fate that White's long and honorable career at the Admiralty should have closed with the failure of the last ship he designed, the celebrated and unlucky Royal yacht. As chief constructor, he was technically responsible for the overweight and instability of this vessel, but in view of his great experience and unusual care and foresight, it seems impossible to reconcile the facts. He was undoubtedly the victim of a too confident trust in his subordinates, a risk which has to be assumed by all those who occupy high places.

In his contact with men, Sir William showed a charming personality, was a clear and ready speaker at public gatherings and took the liveliest interest in every branch of the engineering profession.

One of the writer's happiest recollections is of his meeting with Sir William during his student days and of the keen interest which the latter showed in those at the bottom of the profession of which he himself stood at the head.

Great the pity, that the last years of such a man should have been clouded by one unfortunate mistake.

LETTERS TO THE EDITORS

Save The Oil?

NEWARK, N. J.

TO THE EDITORS:

The writer read with interest the letter by V. G. Iden on page 186 of the March *MARINE ENGINEERING AND SHIPPING AGE* under the heading "Save The Oil."

Although the writer is a believer in conservation of natural resources still he is inclined to look upon the matter of using our supply of oil, coal and other resources from a more or less liberal standpoint. It is well to be thoughtful and careful, still, judging from the figures that I have seen, there is a vast quantity of oil in this earth, the United States having more of it than any other country. The following are some figures credited to M. Gault. The numerals represent barrels.

United States and Alaska	7,000,000,000
Russia and Siberia	5,836,000,000
Persia and Mesopotamia	5,820,000,000
South America and Peru	5,730,000,000
Mexico	4,525,000,000
Central America	3,550,000,000
East Indies	3,015,000,000
China	1,375,000,000
Japan and Formosa	1,235,000,000
Rumania, Galicia, E. Europe	1,135,000,000
India	995,000,000
Algeria and Egypt	925,000,000
Canada	95,000,000

Basing his computations upon the above figures the writer has estimated that the world will have ample oil supply for at least 100 years. At the same time it must be remembered that there are still many unexplored regions and that the earth's oil is doubtless only slightly "scratched" at the present time.

So little is known about oil that we do not even seem to know positively where the oil in the ground came from or how it got there. Two prominent authorities, Mendelejeef and Pyhala, now agree that highly heated metallic carbides in considerable quantity are to be found in the interior of the earth. When these carbides come in contact with moisture they decompose into metallic oxides and hydrocarbons, and, presto, we have oil as a result. This is the so-called "inorganic theory." That is, they claim that oil is a result of action or reaction of inorganic or metallic substances.

Believers in the organic origin state that oil is the result of decayed vegetable and animal matter. Earth pressure, natural heat, natural distillation, and time are claimed by these adherents to be contributing causes.

The writer is merely passing this along as an item of interest. He does not profess to be an authority on the subject himself.

W. F. SCHAPHORST, M. E.

Combined Riveting and Welding

PHILADELPHIA, Pa.

TO THE EDITORS:

My attention has just been called to an editorial in the July issue of *MARINE ENGINEERING AND SHIPPING AGE*, and to letters in the September and November issues on the subject of the use of combined riveting and welding as applied on the crane foundations and surrounding structure of the U. S. *Crane Ship No. 1* (ex-*Kearsarge*). The editorial and letters were based on information appearing in an article in the June issue of *Mechanical Engineering*.

The crane foundation consists essentially of two heavy structural rings, some 60 feet in diameter, projecting about 2 feet above the level of the main deck and extending below

the main deck to the level of the next deck below, *i.e.*, the heavy protective deck. On top of these two rings, the tracks taking the crane wheels are secured. Under various conditions of operation of the crane, tremendous stresses are transmitted through the crane wheels and the circular girders to the surrounding structure of the ship. The loads transmitted through the crane wheels are caused by the weight of the crane structure itself (including the counterweight), the weight of load lifted and the inertia forces caused by the rapid rolling and pitching of the ship in a seaway. Tremendous forces may also be transmitted through repair jacks which are used when the crane wheels are removed for repairs. All of these loads are directly down on the circular girders.

Some of the loads are thrown into the shell of the ship in way of the circular girders by means of brackets connecting the outer girder with the side of the ship between the main and protective decks. By far the greater portion of the loads, however, must be carried on bulkheads below the protective deck. These bulkheads, although in most cases fairly heavy, were not originally designed to take such tremendous loads. The principal problem solved in connection with the foundations for the crane was the reinforcement of these bulkheads to make them strong enough locally (*i.e.*, at the point where they cross the lower edges of the two girders) to take the large concentrated loads coming on them at various times during the operation of the crane, or during the time the ship is in a seaway.

Of course, the bulkheads could have been removed, and structures of suitable strength installed instead. This procedure would have been very expensive, and would also have involved great difficulties in maintaining the watertight integrity of the ship.

The procedure adopted consisted in reinforcing the bulkheads by means of additional shapes and doubling plates riveted to the bulkheads in the places where the stresses occurred. These reinforcements were, in general, carried down only far enough over such areas as would allow the bulkheads to carry the stresses without reinforcement; at such points the reinforcements were stopped. Welding was used extensively between the bottom toes of the upper bounding angles on bulkheads and the corresponding upper edges of the doubling plates. Without this welding, the rivets in the upper bounding angles would certainly have snapped off under the loads transmitted through these angles to the bulkheads. The replacement of the angles with angles of sufficient size, and having sufficient rivets to take the stresses, would have been extremely expensive and would have caused great difficulty in maintaining the watertightness of the ship.

The above use of welding in conjunction with riveting unquestionably gave adequate strength and also resulted in a great saving of cost. The metal added to these bulkheads by means of welding is always in compression, and it is difficult to see how this metal could fail without literally crushing out; there is no doubt that the bulkheads themselves would buckle before the welding failed by crushing.

It would seem that Mr. Owens, the writer of the letter in your November issue, did not thoroughly understand the use to which the welding was put on these bulkheads, as otherwise he would have been able to make more intelligent comment on the subject than he actually did in his letter.

So far as the writer knows, the use of welding in the manner outlined above was the first attempt along this line made on an important engineering project. It is believed that similar use of welding could be made to advantage on structures where difficulty is experienced in getting sufficient area of rivets to resist shear without resorting to excessively elaborate and expensive designs.

Although the angles securing the circular girders to the main deck are very large, heavy and closely riveted, calculation showed that the rivets are not strong enough to take the

shear coming upon them at various times. This condition applied to all rivets in the vertical flanges of the angles on the upper and lower sides of the main deck. Additional strength in shear was obtained by running a fillet weld along the toes of the vertical flanges of these angles. The additional strength in shear required to take the loads was obtained in the case of the angles at the tops of the girders by securing a metal-to-metal joint between the tops of these girders and the cover-plate holding the rail chair castings. Welding would have been specified on the toes of these angles as well had it not been considered cheaper to obtain a metal-to-metal joint by means of chipping the top edges of the circular girder plates.

It is noted that in your editorial you express some doubt as to the strength of a combined riveted and welded joint such as that described in the above paragraph. Before this joint was specified on this important foundation, tests were made in the laboratory of the Philadelphia Navy Yard on the strength in shear of riveted joints, welded joints and combined riveted and welded joints. These joints were in each case made up with the same size angles and plates, the same size rivets and the same rivet spacing as was to be used in the circular girders. The results of the tests clearly demonstrated that the combined riveted and welded joint did give a great deal more strength than either the welded or the riveted joint. The design of the joint was based upon the results of these tests.

The combined riveting and welding in joints consisting of double or single angles and a plate offer little opportunity for extensive use in ship construction, but it is believed that such a joint may be used to advantage in many cases on bridges and other similar structures.

Your editorial, in my opinion, laid somewhat too much stress on the extensive use of welding in the main deck in way of the crane foundations. It is true that a great deal of welding was done on the main deck in this location, but welding was specified mainly because of the great practical difficulties in securing suitable riveted connections. Heavy doubling plates were secured to the upper side of the main deck in way of the crane foundations and it was essential that the upper surface of these doubling plates be flush in way of the circular foundation girders. This condition made it impracticable to fit butt straps on the upper side of the doubled deck except inside or outside of the circular girders. The lower course of the main deck, *i.e.*, the course formerly in the ship, had butt straps and seam straps on its underside, and also had numerous deadlight holes and other openings which had to be patched. These various conditions made the use of butt straps in any portion of the doubling extremely difficult. Butt straps were used, however, in the seams and butts of the doubling in way of the heavy center pin foundation. This pin is called upon to transmit to the structure of the ship, due to rolling in a seaway, alternate transverse thrusts of the order of 2,500,000 pounds just above the level of the main deck. The object in doubling the main deck was to take part of this force, the remainder of the force being transmitted down by means of two heavy plate girders extending between the main and protective decks.

The use of welding on the doubling of the main deck resulted in considerable economy due to the avoidance of riveting difficulties, but did not add appreciably to the ability of the deck to resist the tangential stresses thrown upon it through the center pin of the crane.

My object in writing this letter is to correct erroneous conclusions which might be drawn from the letters appearing in your columns, particularly that of Mr. Owens, and also to point out to designers the application which may be made of welding in reinforcing riveted joints as a substitute for resorting to excessive complication in the design of such joints.

COMMANDER H. E. ROSSELL, C. C., U. S. N.

PERSONAL MENTION

WILLIAM H. STEWART, formerly surveyor for Lloyd's Register of Shipping at San Francisco, is now associated with Edward S. Hough, consulting engineer and marine surveyor of San Francisco.

J. F. MORTON has been appointed district comptroller for the North Atlantic district by the Emergency Fleet Corporation, succeeding H. S. Brown, who has resigned in order to enter private business.

W. E. SPOFFORD, formerly assistant chief draftsman, U. S. Lines, New York, has become chief of the design department, of Henry C. Grebe & Company, Inc., naval architects and marine engineers, Chicago, Ill.

T. R. HARRISON has assumed charge of the research department of the Brown Instrument Company, Philadelphia. Mr. Harrison was formerly associated with the pyrometry department of the Bureau of Standards and very recently with the Champion Porcelain Company of Detroit.

O. P. BAUGHMAN has resigned as district manager of the Luckenbach Steamship Company, Inc., of Cleveland. H. H. Blackmore, who has been connected with the Cleveland office about a year and who is well known to the Lake trade, has been made traffic manager representative in charge of the Cleveland office.

CHARLES A. REISNER, chief engineer of the steamer *James A. Campbell*, has been retired by the Interlake Steamship Company, Cleveland, O., which operates the second largest fleet of vessels on the Great Lakes. He has served this company for over thirty years. F. B. Parker of the steamer *Pegasus* will also be retired.

CHARLES H. POTTER of the Potter Transportation Company, New York, has been re-elected president of the United States Ship Operators' Association for the coming year. Other officials are C. D. Mallory of C. D. Mallory & Company, New York, vice-president; Captain M. H. Tracy, treasurer, and Joseph T. Lykes, secretary.

GEORGE M. MARR, for the past four years district manager in Philadelphia for Charles Corey and Son, Inc., has been transferred to the sales department at the main offices in New York City and Robert L. Reaves, formerly electrical engineer at Hog Island and more recently connected with the Naval Air Station at Lakehurst has been appointed to the district managership to succeed Mr. Marr.

W. J. LOVE, vice-president and trustee of the Emergency Fleet corporation and managing director of the United States Lines, has resigned both of these offices. Mr. Love came to New York from Baltimore in 1894 to join the Atlantic Transport Line and was in the steamship business in New York until he entered the Government service. T. H. Rossbottom, general manager of the United States Lines, succeeds him as director of the United States Lines.

E. A. BRENNAN, who served W. J. Love as executive assistant until his resignation, has been appointed acting director of the New York district of the Emergency Fleet Corporation. Mr. Brennan joined the Fleet Corporation in September, 1921, after many years of shipping experience as executive assistant to A. F. Mack, then district director. When Mr. Love succeeded Mr. Mack, Mr. Brennan remained in the same position.

J. F. McCONKEY, formerly at the Sperry Gyroscope Company offices at Seattle, will have charge of the new Sperry San Francisco branch office which has recently moved to the new Matson Building. O. A. Frischmuth, formerly connected with the Hunt-Mirk Company, will act as assistant to

Mr. McConkey. H. S. Burtis of the New York service department will relieve Mr. McConkey in Seattle and W. I. Selover of the Los Angeles office has moved from pier A, slip 2, Wilmington, to 407 Canal avenue, Wilmington, Los Angeles.

REAR ADMIRAL H. I. CONE, who has recently been appointed assistant to Rear Admiral L. C. Palmer, president of the Emergency Fleet Corporation, was born in Brooklyn,



Rear-Admiral H. I. Cone, U.S.N.

April 26, 1871. He graduated from the Florida Agricultural College in 1889 and from the United States Naval Academy at Annapolis in 1894. He served on the U. S. S. *Baltimore* during the Spanish war and fought under Dewey at Manila Bay. He commanded a flotilla of torpedo boats on a voyage from Hampton Roads to San Francisco in 1908 and was fleet engineer of the Atlantic Fleet on its trip around the world from June, 1908, to March, 1909. On May 21, 1909, he was made head of the Bureau of Steam Engineering with the rank of rear admiral and engineer-in-chief. His other important commands up to the time of the war were on the U. S. S. *Utah* and the U. S. S. *Dixie*. For a short time he was marine superintendent of the Panama Canal. During the war he was in charge of the U. S. Naval Aviation forces in foreign service. On October 10, 1918, he was wounded while on board the steamship *Lienster* when she was sunk in the Irish Sea by a German submarine. His citations include the D. S. M. (U. S. Navy); Commander Order British Army (military brevet); Distinguished Service Order (British); Officer Legion of Honor (French); Order of St. Maurice et St. Lazarus (Italian).

CAPTAIN FRED J. SIMPSON, marine superintendent of the Detroit & Cleveland Navigation Company for several years past, resigned recently to accept the position of general



Capt. F. J. Simpson

manager of the Detroit & Windsor Ferry Company. One of his first moves in becoming general manager has been to order the construction of one of the largest automobile and passenger ferries ever put in service on the Great Lakes which will be delivered next September. Captain Simpson served 34 years with the Detroit & Cleveland Navigation Company, working his way up from lookout to captain. When he received a commander's license he was given command of the ship on which he started as deck hand and he was known as the youngest captain on the Great Lakes. He sailed for many years on the steamers of the Lake Huron division of the D. & C. and later commanded the flagship *City of Detroit III* and other large steamers of the fleet. His last years of service were as shore captain and superintendent.

CAPTAIN BYRON L. REED, U. S. C.G., for the past four years commander of the New York division of the U. S. Coast Guard and captain of the port, has been appointed superintendent of construction and repair of the Coast Guard Service with headquarters in Washington. His successor in New York is Captain W. E. V. Jacobs.

SENATOR JOSEPH E. RANDELL of Louisiana has been re-elected president of the National Merchant Marine Association in Washington. The vice-presidents elected are H. F. Alexander of Seattle, Wash., president of the Pacific Steamship Company and Admiral-Oriental Lines; O. E. Bradfute of Zenia, Ohio, president of the American Farm Bureau Federation; T. F. Cunningham of New Orleans, president of the Mississippi Steamship Company; Matthew Hale of Greenville, S. C., president of the South Atlantic Maritime Corporation, and H. H. Raymond of New York, president of the Clyde-Mallory Lines.

W. J. BERRY, C.B., R.C.N.C., new director of naval construction of Great Britain, is the first member of the construction corps who has been promoted to the highest office to which a naval constructor can aspire direct from the corps itself. Born in 1865, Mr. Berry entered the royal dockyard at Sheerness where he took highest place in the examinations and was made probationary assistant constructor at the Royal Naval College at Greenwich. Here he carried off high honors in examinations and was accepted as a member of the Royal Corps of Naval Constructors in the year 1887. Early in his official career he was appointed to the royal dockyard at Chatham. Mr. Berry was later appointed to the Admiralty, being engaged on the actual design of a number of important ships with the rank of constructor. He continued to serve on design work until 1907 when he was promoted to the rank of chief constructor and appointed to the Dockyard at Malta where he remained until 1912 and was again appointed to the Admiralty and made assistant director of naval construction. In the year 1917, when drastic alterations were made in the organization of the Admiralty, Mr. Berry was appointed to the new position of director of warship production, a post which he filled with every success and which he held immediately prior to his appointment to the directorship of naval construction. He is a member of the council of the Institution of Naval Architects and also of the house committee. The title "C.B." was conferred on him by His Majesty, King George, several years ago for special services.

OBITUARY

JOSEPH B. CARRUTHERS, for many years superintendent of the joiner shop of the Fore River Shipbuilding Corporation, Fore River, Mass., died on March 9 at his home, 27 Dixwell avenue, President's Hill, Quincy, Mass.

CAPTAIN JAMES BRUCE McDONALD, 42, died in Detroit, Michigan, on February 13. He was Captain of the D. and C. steamer *City of Cleveland III* and was one of the best known passenger steamer captains on the Great Lakes.

HENRY BROERS, a well known shipping man of New York, died March 4 at his residence 157 Prospect Park West, Brooklyn. For the past thirty years Mr. Broers was connected with the firm of Norton, Lilly & Company, New York.

CAPTAIN JOSEPH LAWS, aged 62, died in St. Clair, Mich., on March 1. Captain Laws was in the service of the Pickands, Mather & Company fleet from 1907, retiring several months ago because of poor health. At one time he served the Gilchrist & Jenkins fleet on the Great Lakes.

WILLARD PALMER WHITLOCK, president of the Whitlock

Cordage Company, New York, died on March 3 at his home, 637 North Broad street, Elizabeth, N. J. Mr. Whitlock was born in Brooklyn. After completing two years in the College of the City of New York, he entered the employ of Barling & Davis of 46 South street, New York, owned by the Elizabethport Steam Cordage Company and in 1891 helped form the Lawrence Cordage Works with a factory in Brooklyn. Five years later the company was reorganized and the name changed to the Whitlock Cordage Company, its plant being in Jersey City. Mr. Whitlock is survived by his wife and four sons, his sons having been associated with him in the business.

CAPTAIN HOWARD L. HIGGINS, one of the oldest members of the Marine Society of the City of New York, formerly vice-president of the Society and well known as a shipmaster,



Capt. H. L. Higgins

recently died at his home in Radnor, Pa., as noted in the March issue of MARINE ENGINEERING AND SHIPPING AGE. Captain Higgins was born in the town of Orland, Maine, and went to sea at the age of 12 years. He afterwards served in vessels trading at various ports throughout the world and soon mastered the art of navigation and became mate of a square rigger engaged in the foreign trade. At the age of 21 he was a full-fledged captain and for many years remained in

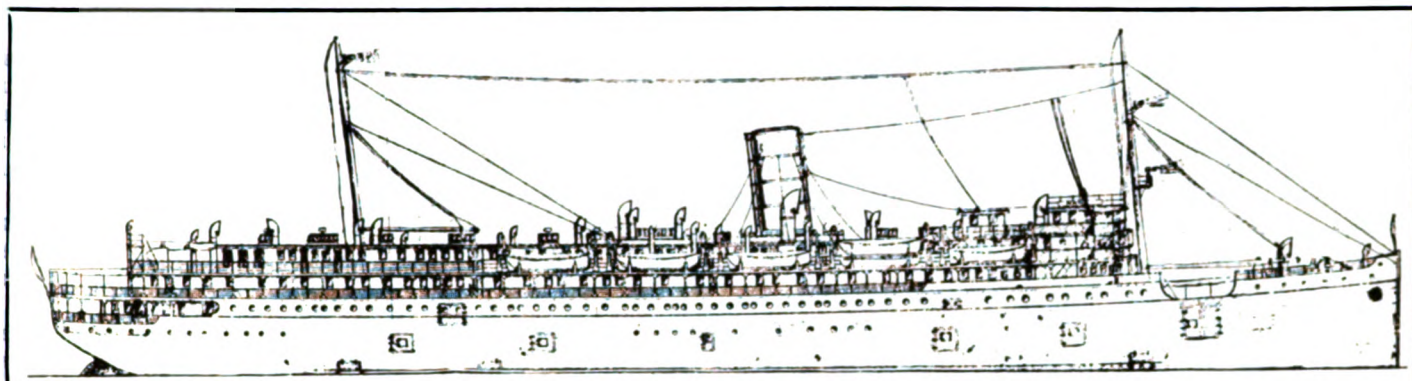
command of the ship *Southern Chief*. When sailing vessels began to disappear from foreign service, Captain Higgins began his long association with the Southern Pacific Company which continued up to the time of his retirement with the exception of a period during the Spanish-American War when he was in the service of the Government.

REAR ADMIRAL GEORGE BRINKERHOFF RANSOM, U. S. N., retired, died at his home in Plattsburg, N. Y., February 27. He graduated from Annapolis in the naval engineering corps and spent 32 years in active service at sea. Rear Admiral Ransom was chief engineer of the U. S. S. *Concord*. On May 1, 1898, he took part under Admiral Dewey in the Battle of Manila Bay. He was head of the Navy Yard, steam engineering department, for six years; inspector of machinery and engineering materials for six years and for three years was an instructor at Annapolis. He also taught three years in the University of Wisconsin, retiring in 1913.

LEONARD PESKETT, naval architect of the Cunard Steamship Company, died at his home in England, on March 7. Mr. Peskett entered the service of the Cunard Company as a draftsman in 1884. At this time the crack ships of the line were the *Umbria* and *Etruria*, the last of its single screw passenger and mail steamers. In his forty years of service Mr. Peskett was identified with the construction and largely responsible for the design of the many notable vessels built for the Cunard fleet. He had a unique experience in the design and construction of large Atlantic liners and possibly a greater first hand knowledge of the requirements necessary for the successful design and operation of this class of vessel than any of his contemporaries. His ability to put in practice the results of his wide experience is clearly evidenced by the great advance shown by each succeeding type of vessel built by the Cunard Company during the fifteen years that Mr. Peskett was its naval architect.

The Month's Shipping and Shipbuilding News in Brief

Shipyard, Steamship and Port Activities and Other Notes
of Interest in All Branches of the Marine Industries



OUTBOARD profile of passenger and freight ships designed by Theodore E. Ferris for the Clyde Line, construction of which may be started soon by Newport News Shipbuilding and Drydock Company.

M. & M. and U. F. Not to Build "At Present"

REPORTS have been circulating in the marine district to the effect that the Merchants & Miners Transportation Company, of Baltimore, Md., and the United Fruit Company, whose general offices are at 131 State Street, Boston, Mass., have under consideration a program for the future involving the construction of several new ships. The report credited the Merchants & Miners Line with having two additional steamers in view and the United Fruit Company with either extensive additions to its fleet to be built abroad, or two, or possibly more, ships to be built in American yards.

MARINE ENGINEERING AND SHIPPING AGE is advised by A. D. Stebbins, President and General Manager of the Merchants & Miners Transportation Company, under date of March 18, that "We have no idea at this time of constructing additional ships," and by Asa F. Davison, General Manager of the Marine Department of the United Fruit Company, at Boston, Mass., under date of March 19, that "We are not at the present time contemplating the building of any ships in this country."

Todd Corporation Opens New Yard at New Orleans

On Saturday, March 15, the new plant of the Todd Shipyards Corporation, at New Orleans, known as the Todd Engineering, Dry Dock & Repair Company, Inc., was officially opened. This plant is completely equipped with modern machinery of every

Construction of Two Clyde Liners Expected to Be Started in Near Future By Newport News Shipbuilding Co.

SIGNING of a contract for the construction of two passenger and freight ships to be built for the Clyde Line by the Newport News Shipbuilding & Drydock Company is expected in the very near future.

Columbia Steamship Co. Orders Million Dollar Freighter

THE Columbia Steamship Company, of Cleveland, O., has placed with the Great Lakes Engineering Works, Detroit, Mich., for 1925 delivery, a contract for a bulk freighter of the 600 foot class to cost about \$1,000,000.

The ship will be built at the River Rouge yard and will be driven by triple expansion engines. She will be operated in the coal, ore, stone and grain trades. The ships of the Columbia Steamship Company are operated by Oglebay-Norton & Company with John F. Kelly as fleet manager. The new freighter will replace the steamers *Center*, *Colonel* and *Yosemite* which the company has sold to A. E. R. Schneider.

This order makes five steamers of the 600 foot class which American builders now have under construction.

type and is under the supervision of General Manager H. E. Hart.

The Todd Engineering, Dry Dock & Repair Company, Inc., is now prepared to handle any and all marine repairs to vessels in and near New Orleans. This plant, as all other Todd yards, will have a staff of expert oil burning engineers to assist and advise on all oil burning or kindred problems.

It is believed that the total cost of the ships will be close to \$3,500,000. The vessels were designed by Theodore E. Ferris, naval architect of 30 Church Street, New York City, and will probably be in operation in the spring of 1925.

The proposed ships are to have a length overall of 402 feet, length between perpendiculars 387 feet 6 inches, breadth molded 54 feet, depth molded to hurricane deck 31 feet 6 inches, designed load draft 18 feet, speed in service 14½-15 knots.

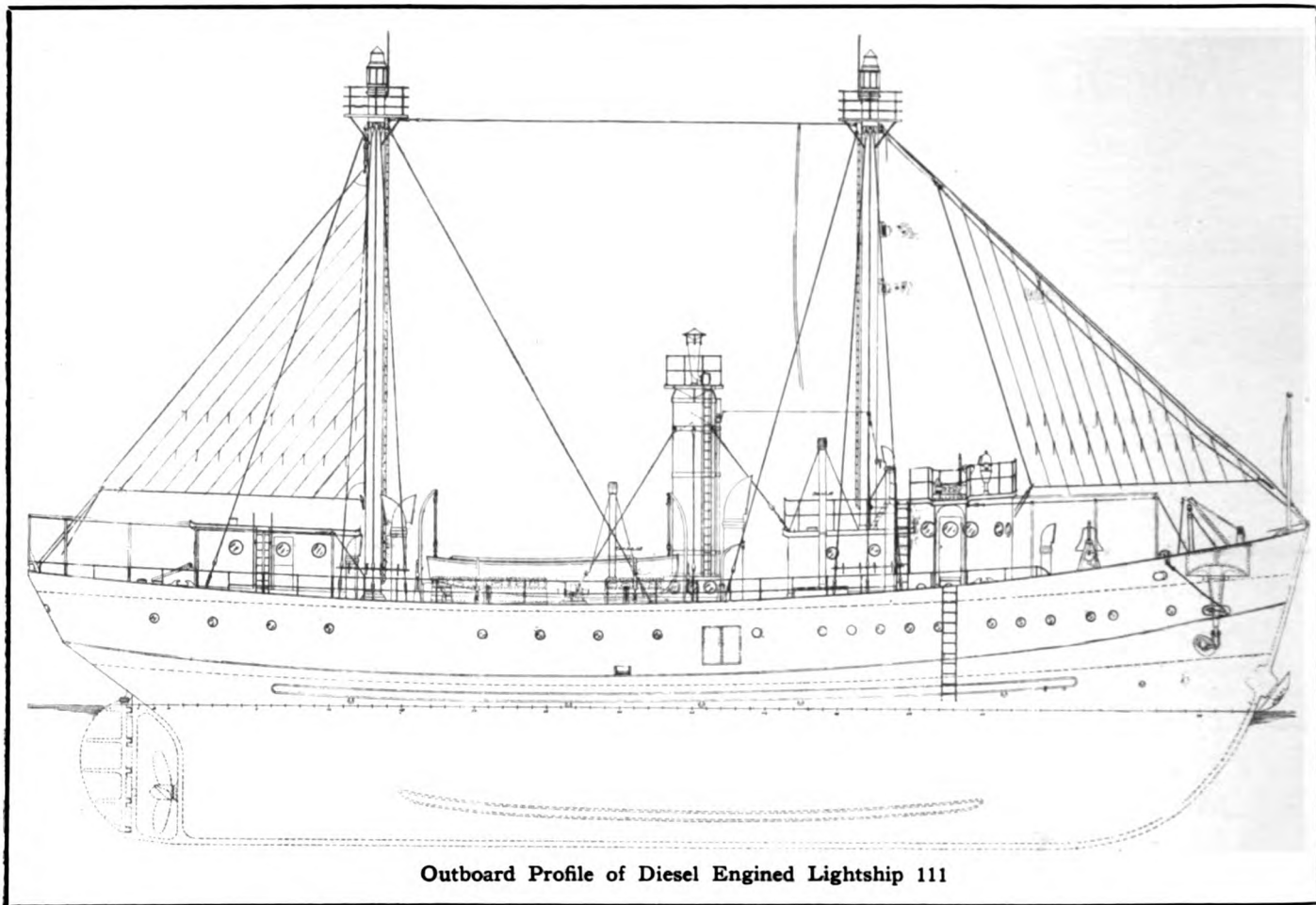
The ships will have American Bureau classification and will be equipped with turbines of the Newport News Curtis type, single reduction gears, developing 4,200 shaft horsepower. Steam will be supplied by four oil-burning Scotch boilers with forced draft.

Accommodations will be provided for approximately 400 first class and steerage passengers.

Plans and specifications were originally issued last year for the construction of a type "A" and a type "B" vessel, principal details concerning which were announced in these columns at that time. The ships to be built are of the "B" type.

B. & O. Asks Bids on Three-Quarter Million Dollar Carfloat Job

THE Baltimore & Ohio Railroad will open bids in the near future for one 3-track carfloat and three 2-track carfloats, the latter having a platform in the middle. The boats will have a length of 285 feet, beam 39 feet and will probably cost a total of close to three-quarters of a million dollars.



Outboard Profile of Diesel Engined Lightship 111

Proposals Opened March 24 for N. & W. Passenger Steamer

THE Norfolk and Washington Steamship Company, Washington, D. C., received bids on March 24 for the construction of a new passenger ship to take the place of the company's steamer, *Midland*, which was recently burned. Proposals for the reconditioning of the *Midland* were received by the company on February 23 and it is believed that, due to the extent of this work, which would cost close to \$400,000, it has been decided to build a new vessel.

The proposed steamer will have an overall length of 305 feet 8 inches, length between perpendiculars 297 feet 7 inches, beam 42 feet 5 inches, molded depth 18 feet and a mean draft of 12½ feet.

The steamer will be driven by triple expansion engines, steam being supplied by four Scotch boilers burning coal for fuel. The vessel will be similar to the company's steamer *Northland* and in addition to freight will carry between 300 and 350 passengers. She will have a speed of 18 knots.

Cleveland Office of Marine Engineering and Shipping Age Moved Into Larger Quarters

The Cleveland, Ohio, office of the Simmons-Boardman Publishing Company, publishers of MARINE ENGINEERING AND SHIPPING AGE, has been moved from 4300 Euclid avenue to more commodious quarters at 6007 Euclid avenue.

Bath Iron Works Low Bidder for Diesel Engined Vessel for Lighthouse Bureau of Department of Commerce

THE Bath Iron Works, of Bath, Me., with a price of \$157,000 was the low bidder for the construction of a single screw, steel Diesel engine-propelled, second class light vessel (No. 111), as a result of the opening of proposals by the Lighthouse Service of the Department of Commerce, Washington, D. C., on March 3. Other bidders were: Ira S. Bushey & Sons, Brooklyn, N. Y., \$166,900; Bethlehem Shipbuilding Corporation, New York, \$174,900, and the Staten Island Shipbuilding Company, Mariners Harbor, N. Y., \$179,960. Southern Shipyard & Drydock Company, \$218,849.

The proposed boat will have an overall length molded of 132 feet 4 inches, beam molded 30 feet, minimum depth from top of main deck beam at side to top of keel 16 feet, displacement molded at 14 feet 4 inches draft approximately 775 tons. The main engine, which will be furnished by the Government, will be one 8-cylinder, self reversible Winton Diesel engine, bore 12 15/16 by 18-inch stroke, having an estimated brake horsepower of 400. The main propelling machinery, including the thrust bearing and thrust shaft, the propeller together with the 25-kilowatt generating set, bilge pump, auxiliary high pressure air compressor, one low and two high pressure air bottles, a fuel oil service pump, the lubricating oil filter and cooling coils and the mufflers, will be furnished and delivered to the contractor at his place of business by the Government. This machinery is in place in the United States army 150-

foot, concrete river vessel *General Rufus Ingalls*, or a similar vessel, which will be delivered afloat at the wharf of the contractor.

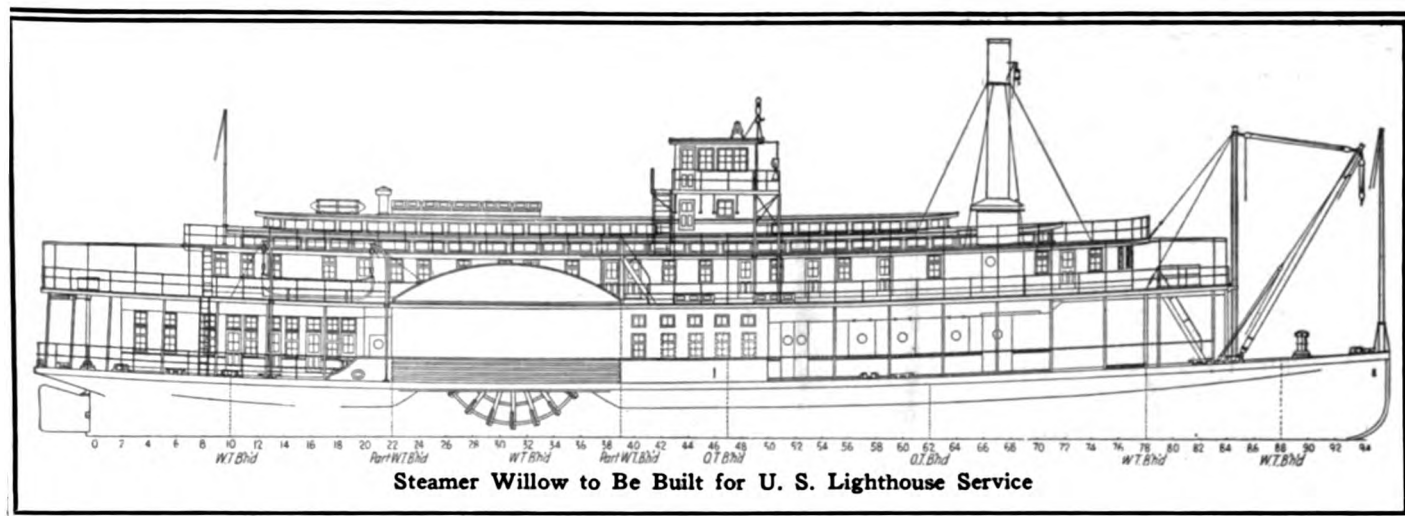
GENERAL DESCRIPTION

The vessel will have a continuous sheer line, a curved stem, an overhanging stern, a continuous wooden upper deck, a forward steel deck and pilot house with bridge containing the master's quarters, the deck storage room, enclosed passageway to the crew's space, etc., an after deckhouse containing the radio apparatus, quarters for its operators and passageway to the main deck below. There are to be steel skylights, two tubular steel lantern masts.

The ship will be heated throughout by steam and a water-tube boiler, similar to the Almy type "A," with a heating surface of not less than 158 square feet, arranged to use oil for fuel, will be installed in the forward engine room complete with all parts. The boiler is to be equipped with an approved oil burning system, operating with compressed air, under an air pressure of from 60 to 100 pounds.

GOVERNMENT SUPPLIES HULL

In addition to the engine and other machinery, the Government will supply one steel hull, incomplete as to masts, air ports, dead lights, joiner work, fittings, equipment, rigging, painting, etc., this hull to be turned over to the contractor afloat at the wharf of the Bath Iron Works Company, Bath, Me.



Atlantic City Line Plans New Vessels in Program for 1925

A 1925 PROGRAM of expansion, which will include the construction of two modern passenger ships, costing about \$1,000,000 each, is included in the future plans of the Atlantic City Line, Pier 12, East River, New York City, according to official information obtained by *Marine Engineering and Shipping Age*. The company will begin a daily service between New York and Atlantic City with the sailing of the steamer *City of Seattle* on March 27. The *City of Seattle* is an oil burning, steel vessel, 240 feet in length. Negotiations are under way for the purchase of another steamer to run with the *City of Seattle*.

Victor S. Fox is president of the new line; Hugh A. Lamb, vice-president; F. A. Kelly, secretary and treasurer, and C. L. Haskins, port captain and marine superintendent. It was stated that the tentative plans for the building of new steamers provide for vessels burning oil for fuel, developing a speed of 22 knots, modernly equipped and capable of carrying about 1,500 passengers each.

Engineer Office Plans Two Maneuver Boats

THE United States Engineer Office, Louisville, Ky., will open bids about April 1 for two steel-hull maneuver boats, one for the Louisville district, to be delivered at Louisville, and one for the Huntington, W. Va., district, to be delivered at Marietta, Ohio. The hulls are 26 feet by 60 feet with a depth at gunwales of 3 feet 7½ inches.

Barge Construction and Oil Conversion

The Tennessee-Arkansas Gravel Company, Arkansas City, Ark., plans to build five new wooden barges, 100 feet by 26 feet by 7 feet. The same company also plans to convert a tugboat and a dredge to oil burners.

Steel Dredge Hull and Scows

The General Contracting Company, Columbia Building, Pittsburgh, Pa., plans to purchase one steel hull dipper dredge and two steel hull scows; \$40,000 and \$25,000, respectively.

Charles Ward Engineering Works Low Bidder for Construction of Steel Lighthouse Tender Willow

THE Charles Ward Engineering Works, Charleston, W. Va., submitted the lowest prices for the construction of the steel lighthouse tender *Willow*, at the opening of bids by the Lighthouse Service, Department of Commerce, Washington, D. C., on March 20. The Ward Company offered a price of \$250,000 for delivery at Charleston and \$255,000 for delivery at St. Louis.

The steamer will have an overall length of 200 feet, beam over guards molded 65 feet, depth at side (base line to top of guard) 8 feet, draft loaded 4 feet 8 inches. The plans and specifications require the construction and entire completion of a lighthouse tender of the radial sidewheel, steam driven, river type, suitable for navigating the Mississippi and tributary rivers.

ENGINES AND BOILERS

The propelling machinery will consist of two non-condensing, high pressure engines, each direct-connected to and driving an independent paddle wheel. Each cylinder will have a bore of 29 inches and a stroke of 84 inches, all parts being designed for a working pressure of 220 pounds. The paddle wheels will be about 23 feet 6 inches in diameter, having a total length of buckets of about 9 feet, the buckets to be of oak 2 inches thick. A steam reversing gear will be fitted complete and connected to each engine.

There are to be six steam boilers of the Mississippi River type, built in two batteries of three boilers each and designed for a working pressure of 220 pounds per square inch. Each boiler will be about 28 feet long and their total heating surface is to be not less than 2,120 square feet and must be ample to furnish steam to the engines and all auxiliaries when operating under full power with natural draft.

There is to be a complete installation for the use of oil as fuel, the system to consist of storage and settling tanks for fuel oil, two oil pumps, two oil heaters, two suction and discharge strainers, necessary burners for each boiler, also valves, pipes, fitting connections, etc., for oil and steam. The oil pumps, heaters and strainers, are to be in duplicate and of such capacity that either set will be capable of operating the system thoroughly. The burners are to be of the

steam atomizing type, designed for successful operation at a pressure from 30 pounds upward on the oil and steam. Two duplex pumps of approved type and manufacture are to be furnished and located in the fire-room, each having sufficient capacity to supply all burners on all boilers. The main generating set will be of a steam turbine, direct-driven type, as approved, having a capacity of 20 kilowatts, making approximately 2,000 revolutions per minute at a steam pressure ranging from 150 to 220 pounds.

There is to be a compression type, direct-expansion, refrigerating machine of approved design, using carbon dioxide gas as a refrigerant and of sufficient capacity to maintain a temperature of 35 degrees in the meat room, 50 degrees in the dairy locker and about 55 degrees in the provision room when the outside temperature is 100 degrees, using circulating water direct from the river and operating a maximum of eight hours in every 24.

OTHER EQUIPMENT

The main feed pump will be of the horizontal simplex, outside center packed, plunger type, having a steam cylinder 9 inches in diameter, water plungers 6 inches in diameter with a stroke of 12 inches. The fire, deck and bilge pump will be of the vertical duplex type similar to the Worthington "LO" pattern, having steam cylinders 9 inches in diameter, water cylinder 6 inches, with a stroke of 10 inches. The water service pump will be of the type specified for the feed pump, having a steam cylinder 6 inches in diameter, water plunger 4 inches in diameter and a stroke of 8 inches. Additional equipment includes a feed water heater of the closed marine type and approved make, having a steel shell with removable tubes and capable of heating all feed water required, with the engines running full speed, to 220 degrees F.

There is also to be furnished and installed one vertical fire tube boiler, designed for a working pressure of 150 pounds with a heating surface of about 180 square feet, to supply steam to the heating system, auxiliary electric plant, fire and feed pumps, and to be used to start the fuel oil burners of the main boilers. It is to be fitted to burn coal as fuel.

Staten Island and Federal Yards Submit Low Bids for Construction of Ferryboat for New York Central

THE Staten Island Shipbuilding Company, with a price of \$454,000, was the low bidder for the construction of a new ferryboat for the New York Central Railroad, in accordance with the specifica-

tions, at the opening of tenders on Friday, March 14. On alternative proposals, provision of the vessel to be by W. & A. Fletcher engine, the Federal Shipbuilding Company offered the lowest figure of \$464,566. The prices bid were as follows:

Staten Island Ship. Co.	\$454,000	Fletcher Engine	\$467,000
Federal Shipbuilding Co.	460,000		464,566
W. & A. Fletcher Co.	482,900		
Sun Shipbuilding Co.	506,156		542,956
New York Shipbuilding Co.	507,000		517,000
Todd Shipbuilding Corp.	509,420		519,220
Bethlehem Ship. Corp.	512,550		504,500
William Cramp & Sons	548,000		560,000

Federal Shipbuilding Company is Lowest Bidder for Reconditioning and Conversion of Former Collier Vulcan

THE Federal Shipbuilding Company, with a price of \$106,325 and 60 days time was the low bidder for the work of reconditioning and conversion to oil burning of the steamer *Vulcan* for the Pacific States Lumber Company, of San Francisco, Calif. The ship was formerly a United States collier and will probably be used as

a lumber carrier. The bids submitted for the work were as follows:

Federal	\$106,325	60 days
Sun	109,000	50 days
Robins	117,750	50 days
Newport News	126,000	45 days
Bethlehem	139,500	50 days

Howard Yard Awarded Contract for New Orleans Ferries

The contract for the construction of two ferryboats for the Algiers Public Service Company, New Orleans, La., has been awarded to the Howard Drydock & Shipbuilding Company, Jeffersonville, Ind., at a price of \$135,973 each.

Bids April 10 for Five Steel Maneuver Boat Hulls

U. S. Engineer, P. O. Box 72, Louisville, Ky., will take bids about April 10 for five steel maneuver boat hulls, one for Louisville, one for Fernbank, and three for Marietta, Ohio.

To Build New Tug

According to information obtained by MARINE ENGINEERING AND SHIPPING AGE, the Carnegie Line of Pittsburgh, Pa., plans to build a new tugboat for use in Pittsburgh harbor. The vessel will be equipped with two 75 horsepower engines.

To Build Steam Towboat

The Union Barge Line, Pittsburgh, Pa., (newly incorporated) is drawing plans for an all steel stern wheel towboat, 32 feet by 145 feet. It will probably be equipped with four boilers and engines will be compound condensing type, 16 by 30 by 7.

Steel Pontoon

The Algiers Public Service Company, of New Orleans, La., R. P. Nolan, Manager, will receive bids in the near future for the construction of one steel pontoon, 40 feet by 110 feet by 4 feet.

Cutting Torch Patents Sustained

OXYACETYLENE engineers, manufacturers of oxy-acetylene cutting torches and users of such equipment will be interested in the decision of Judge Learned Hand on January 8, 1924, in Davis-Bournonville Company vs. Alexander Milburn Company, which has been pending for several years in the United States District Court for the Southern District of New York. The decision sustains the contention of the Davis-Bournonville Company and its successor, Air Reduction Company, Incorporated, that cutting torches with tips having a plurality of heating jet passages arranged about a central cutting oxygen jet passage are infringements of U. S. Letters Patent No. 874,666 and No. 1,028,410, owned by the Air Reduction Company, Inc.

These patents cover the arrangement of heating jet passages in a torch tip both with and without provision for the mixing of the heating gases within the tip. The decision is, therefore, of equal importance in its bearing on oxy-acetylene cutting with the decision rendered some years ago in the suit under the Jottrand patents.

Ward Recommended for Quar- terboat Construction Contract

The bid of the Charles Ward Engineering Works, of \$10,420, for a steel quarterboat hull for the Huntington, W. Va., Engineer Office, has been recommended for acceptance.

Steel Barges for Buffalo

The United States Engineer Office, Buffalo, N. Y., plans eight steel deck barges, 30 feet by 100 feet. Plans are not yet completed.

TRADE PUBLICATIONS

CHAIN HOISTS.—The Motorbloc, a motor-driven chain hoist with many applications, is the subject of a bulletin issued by the Motorbloc Corporation, Summerdale, Pa., Philadelphia, Pa.

MANUAL INSTRUCTIONS FOR WELDING OPERATORS.—A manual of instruction for welders based on the contents of the *Welding Encyclopedia* has been prepared by the *Welding Engineer*, Chicago. This book is of general interest to all those engaged in practically any form of welding work.

STEEL SERVICE.—A series of 7 plates, showing in pictorial form the story of the service supplied by Joseph T. Ryerson Steel Plants has been sent out by this company from its Chicago office. Details of six service plants are completely outlined.

DIRECT CURRENT PORTABLE INSTRUMENTS.—Ammeters, milli-ameters, voltmeters, millivoltmeters, galvanometers, shunts and multipliers are described by the Roller & Company, New York, manufacturers of electrical instruments, meters and circuit breakers, in Bulletin No. 210 recently issued.

OXYGEN FROM THE AIR.—A description of the plant and process employed in producing oxygen from the air by the "Oxeco" fractionation method is contained in a catalogue issued by M. Keith Dunham, 110 S. Dearborn street, Chicago. Complete details of the process and equipment used are given in this catalogue.

GENERATOR COOLERS.—The U-fin cooler, manufactured by the Griscom-Russell Company, New York, is one of the latest series of types of air coolers used in connection with the operation of turbo electric generators. This cooler, which is of the enclosed type, is described and illustrated in Bulletin No. 1216 issued by the company.

GEAR WHEELS AND GEAR CUTTING.—A treatise on gears, compiled by the Gear Works, Boston, Mass., has been prepared covering the entire subject of gear wheels and gear teeth. This book has been used for reference in drafting and technical schools and is in use by draftsmen, pattern makers, machinists and amateurs all over the country.

TWO-FLOW RING CIRCUIT WATER-HEATING BOILER.—A 268-page catalog compiled by Edgar Kidwell and published by the Kidwell Boiler Company, Milwaukee, Wis., contains a clear explanation of the principles underlying correct boiler design and operating their application to boiler analysis and how they are correctly followed in the design of the Kidwell boiler.

MARINE PAINTS.—Sample color cards of the marine paints and compositions made by the Federal Composition & Paint Company, New York, are contained in a bulletin sent out to the marine industry. Various compositions for steel and iron hulls, outside paints, deck paints, smoke stack paints, and the like, are given in detail together with tables showing the covering capacity of various compositions.

BITUMINOUS COATINGS.—Two illustrated folders, showing the application of bituminous coatings made by the Briggs Bituminous Composition Company, Inc., New York, illustrate the applications of "Ferroid" bituminous enamel for places exposed to severe corrosive conditions and "Tenax" composition decking and other forms of anti-corrosive compositions applied to ships.



Guests on Demonstration Run of Standard Oil, Diesel-Electric Tanker
J. H. Senior at Baltimore on March 14

French Yards Building Vessels for Foreign Owners By Our Paris Correspondent

A CEREMONY which was intended to strengthen the bonds of sympathy existing between France and the United States took place at Saint-Nazaire on February 21 on the occasion of the launch of the cable-ship *Cyrus-Field* built by the Chantier et Ateliers de Saint-Nazaire-Penhoet to the order of the Western Union Telegraph Company.

The event was significant as regards the position of the French shipbuilding industry in the world market. The depreciation of the French currency coupled with the good repute of French construction has led many foreign shipowners to place orders for new vessels with French shipbuilders in the course of the last few months, but in the present case a still greater interest is to be found in the fact that this important order placed by an American firm may be considered as a first step towards a strengthening of the trade relations and of the bonds of sympathy between the two great republics who have fought side by side in the World War.

The *Cyrus-Field* is 211 feet long, 34 feet beam and 18 feet 6 inches deep, with a displacement of 2,155 tons and a deadweight capacity of 1,070 tons. Her propelling machinery consists of two triple expansion engines developing a total of 1,200 horsepower. The oil burning equipment is to be of the Peabody type, the same as fitted on the *Leviathan*. This type was chosen by the owners as being especially fit for the service of a cable-ship which has to be run at variable speeds unlike passenger or ordinary cargo vessels whose engines are worked at a more uniform speed, in the course of their voyages.

The *Cyrus-Field* is to be fitted with the most modern navigating and cable-laying appliances. A Sperry gyro compass of the latest type will be installed on the bridge, operating repeater compasses in the wheelhouse, at the after steering gear, in the captain's cabin and on the forecastle head; bearing pelorus repeaters will be installed at each wing of the bridge while a Sperry automatic course recorder will be fitted in the chart room. The vessel will be also equipped with a Sperry submarine log and propeller revolution transmitter operating indicators on the forward bridge, captain's cabin, forecastle and poop, and two Sperry 18 inch high intensity searchlights are to assist in night operations.

January was marked by the placing of foreign orders with French shipbuilders. The *Stoomvaart Matshappij Nederland*, Amsterdam, placed an order for a motor passenger liner with the Ateliers et Chantiers de la Loire. The tenders made by French concerns were considerably lower than those made by Dutch shipbuilders, the difference in favor of the former being about 25 per cent. The vessel is to be 540 feet long overall, 520 feet between perpendiculars, 67 feet beam and 38 feet 6 inches deep. Her mean draft will be 28 feet. The ship will have a gross tonnage of about 16,000 tons and a displacement of 22,000 tons. The propelling machinery will consist of two two-cycle 8-cylinder Sulzer marine engines, each motor developing 4,000 horsepower. This liner is to be placed in service on the Amsterdam-Batavia line. It is learned that the motors will not be built in France, but at the Winterthur works of Messrs. Sulzer Bros.

A further foreign order had been secured by the Chantier et Ateliers de Saint-Nazaire-Penhoet from a Norwegian concern, Messrs. Wilh. Wilhelmsen, for the construction of two motor cargo vessels 416 feet long, 54 feet beam and 38 feet deep. Each of these vessels will be propelled by two Burmeister and Wain 2,000-horsepower engines.

New Diesel Engine Company Formed

THE Mianus Diesel Engine Company, recently incorporated in Connecticut, has consolidated with the old Mianus Motor Works.

A very substantial amount of fresh capital has been put into the company and the management has been greatly strengthened by the addition of Wm. N. Shaw and F. S. Jerome.

Mr. Shaw, who is president of the Eise-mann Magneto Corporation, has been interested in Diesel motors since 1909 and has been connected with Carel Freres and Krupp, as well as several of the Scandinavian engine concerns. Mr. Jerome is president of the Seymour Manufacturing Company and the American Copper Products Corporation as well as several other concerns.

The Mianus Diesel Engine Company has already established offices in Boston, New Bedford, New York, Philadelphia, Baltimore and Norfolk and expects in the very near future to establish offices on the Great Lakes, also Seattle, San Francisco and Los Angeles.

On May 1, the general sales office of the company will be open at 165 Broadway, New York, with P. G. Schilling, formerly chief engineer of the American Krupp Diesel Engine Company in New York, in charge.

Falk Corporation Announces New Representatives

THE Falk Corporation, of Milwaukee, announces the appointment of representatives in San Francisco and Detroit to handle Falk herringbone gears and Falk-Bibby couplings in those territories.

E. C. Myers is appointed to the San Francisco office with headquarters at 320 Rialto Building. His territory includes the states of California, Oregon and Washington. Mr. Myers is a graduate of Syracuse University in electrical engineering and for several years was with the General Electric Company. For the past year he has been in charge of the New York office of Cotton, Neill & Company, Ltd.

Charles C. Walsh is appointed Detroit representative, with offices at 1500 Real Estate Exchange Building. Mr. Walsh received his engineering education at Highland Park College, Des Moines, Iowa. His career in the engineering and sales field has included service with the Michigan Central Railroad at Detroit, the Morgan-Wright Rubber Works, of Detroit, the S. K. F. Ball Bearing Company and the W. C. DuComb Company.

Ford Motorships to Have Cory Service Installations

AUTHORIZATION to furnish self-synchronous direct current engine and docking telegraph systems has been received by Chas. Cory & Son, Inc., for the new 12,000 ton Ford motorships, building at the American Shipbuilding and Great Lakes Engineering Works.

Cory anti-noise telephones with magnavox patents will transmit navigation control conversations. Cory electric whistle valve, automatic whistle valve operation and associated parts will also be used.

A departure from the customary finishes is being made by the use on all the instruments of highly polished nickel surfaces.

Marine Construction News of the Month

Ship Contracts—New Ship Concerns and Shipyard Improvements—Terminal Projects—Government Contracts

SHIPBUILDING AND REPAIRS

Annual Overhauling, San Francisco, Calif.—Steamer Cleone is to undergo annual overhauling at San Francisco.

General Repairs, Oakland, Calif.—Derrick barge No. 4 has been placed on the Crowley dock for scraping, painting and general repairs.

Steamship Repairs, Buffalo, N. Y.—Steamers H. F. Black, W. L. Brown, J. J. Barlum and C. A. Reiss are undergoing repairs at Buffalo.

Towboat Building, Marietta.—Jones & Laughlin Steel Corporation, Pittsburgh, is constructing a new steel towboat for its own use at its Marietta plant.

Painting and Repairs, San Francisco, Calif.—The General Engineering Company received the work of painting and repairing the Kvitchak and the Frank D. Stout.

Steamship Drydocked, Chester, Pa.—The steamship Atlanta City, of the Isthmian Lines, has been drydocked at the Sun Shipbuilding and Drydock Company's yard, Chester.

Norwegian Vessel Docked, San Francisco, Cal.—The Norwegian steamer Vlademar Skogland was recently drydocked at the Bethlehem Shipbuilding Company's plant for repairs.

Steamer Docked, Baltimore, Md.—The Maryland Drydock Company has been awarded the contract for docking and repairs to the steamer West Quechee by the Shipping Board.

Steamer Drydocked, Chester, Pa.—The Barber Line steamship Archer has been drydocked at the Sun Shipbuilding and Drydock Company's yard for miscellaneous repairs and painting.

Plate Fitting, Philadelphia, Pa.—The William Cramp & Sons' Ship and Engine Building Company has been awarded a contract to fit three plates on the British steamship Lady Kathleen.

Voyage Repairs, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation was successful bidder at the opening of proposals for voyage repairs on the Pacific Mail liner President Lincoln.

Voyage Repairs, San Francisco, Calif.—The United Engineering Company, of San Francisco, Cal., has been awarded the contract for making voyage repairs to the President Garfield, of the Dollar Line.

Bids on Salina, West Coast.—At recent bid openings for repairs and renewals on the steamer Salina, the following proposals were received: General Engineering, \$4,131; Moore, \$5,507; Bethlehem, \$6,350.

Repair Contracts, Hoboken, N. J.—Two repair contracts, totaling over \$13,000, were awarded to the W. & A. Fletcher Company, Hoboken, N. J. The steamers involved are the Easterner and the Eastern Tempest.

Low Bidder, Oakland, Cal.—At the opening of tenders on the West Coast, recently, the Moore Drydock Company submitted the lowest bid for a new propeller hub on the Shipping Board steamer Stockton.

Oil Conversion, New York.—Specifications have been issued for the conversion of the steamship Virginia, of the Di Giorgio Fruit Corporation, from a coal to an oil burner, involving an expenditure of about \$30,000.

Dredge Pump, Macon, Ga.—Award has been made to J. J. Schofield's Sons, Macon, Ga., at a price of \$1,025, for a 12-inch dredging pump for the dredge Creighton, by the U. S. Engineer Office, Savannah, Ga.

Ferryboat Bids, New York.—The New York Central received bids at the office of W. B. Pollock,

manager of the marine department, 6 Beaver street, New York City, on March 14, for one double deck, screw propelled, steel ferryboat.

Cleaning and Painting, Alameda, Calif.—At the Alameda plant of the Bethlehem Shipbuilding Corporation the ferry steamer Charles Van Damme and the lumber schooner Bandon have been placed on drydock for cleaning and painting.

Hull Contract, St. Louis.—The William & F. Rupprecht Contracting Company, St. Louis, Mo., has awarded a contract for two steel hulls to the Mid-West Boat and Barge Company, Grafton, Ill., one of the hulls being for a dredge.

Low Bidder, Oakland, Calif.—The Hanlon Drydock and Shipbuilding Company submitted the lowest tender for voyage repairs and drydocking the Shipping Board freighter West Katan, operated by Swayne & Hoyt, at recent bid openings.

Repairs to Raised Tug, East Boston, Mass.—The tug Falmouth, which sank recently, has been raised by Merritt, Chapman & Scott Wrecking Company, and taken to the plant of the Murray Engineering Company, East Boston, Mass., for repairs.

Tugboat, Mobile, Ala.—At the opening of tenders by the U. S. Engineer Office, Galveston, Tex., for the construction of a 65-foot steel motor tug, the Todd Shipbuilding & Drydock Corporation, Mobile, Ala., was awarded the contract at \$44,950.

Barge Launched, San Francisco, Cal.—Barge No. 5, of the Shell Oil Company, under construction by the Bethlehem Shipbuilding Corporation, has been launched. The barge will be used for bay work. Her keel was laid on January 3 of this year.

Snagboat, Charleston, S. C.—The Charleston Dry Dock & Machinery Company, Charleston, S. C., has been awarded the contract for one 90-foot steel stern-wheel snagboat by the United States Engineer Office, Wilmington, N. C., at a price of \$75,930.

Steamers at Sun Yard, Chester, Pa.—Steamer Delaware Sun has been drydocked at the yards of the Sun Shipbuilding & Drydock Company, and the Eastern Prince, of the Furness Lines, is at the same yard for her annual examination and painting.

Ford Ship Launched, Lorain, Ohio.—On March 1, the Henry Ford III, the first of Henry Ford's fleet of vessels for the Great Lakes coal trade, was launched at the yards of the American Shipbuilding Company, Lorain, Ohio. The ship has a length of 600 feet.

Painting, etc., Baltimore, Md.—The new tug John Wanamaker, recently built for the Harbor Board of Philadelphia by the H. E. Crook Company, of Baltimore, has been placed on the railway at the Union Shipbuilding plant for painting and to be prepared for trial trip.

Repairs and Renewals, San Francisco, Cal.—The contract for making general repairs and renewals to the Shipping Board freighter West Farallon, operated by Struthers & Barry, has been awarded to the General Engineering and Drydock Company, San Francisco.

Miscellaneous Repairs and Painting, Chester, Pa.—The tanker Gulfqueen, of the Gulf Refining Company's fleet, and the steamship Dryden have been drydocked at the yard of the Sun Shipbuilding and Drydock Corporation, Chester, for miscellaneous repairs and painting.

Repairing Bulwarks, San Francisco, Calif.—The Eureka Boiler Works, of San Francisco, were awarded a contract for repairing the bulwarks of the freighter Harold Dollar, recently, on a time and material basis, the Eureka Boiler Works submitting no bid on the job.

Contract Awarded, Middleport, Ohio.—The Middleport Boiler Works, Middleport, Ohio, has received the contract for installing three new boilers, 40 inches in diameter, 26 feet long, on the towboat Eugene Dana Smith, of the Campbell's Creek Coal Company, Campbell's Creek, Ky.

Vessel Overhaul.—At the opening of tenders on the West Coast, for overhauling and reconditioning of the liner Sierra, recently purchased by the Oceanic Steamship Company, the Bethlehem Shipbuilding Corporation, as low bidder, was awarded the contract at \$29,997 in 73 days.

Barge Contract, Pittsburgh, Pa.—The contract for the construction of eight steel barges, 120 by 36 by 7 feet (two with cargo boxes), has been awarded by the United States Engineer Office, Florence, Ar., to the American Bridge Company, Frick Building, Pittsburgh, Pa., at a price of \$137,840.

General Overhauling, Long Beach, Cal.—The schooner yacht Invader, owned by Don Lee, has been placed on the ways at the Craig shipyard at Long Beach. She is to undergo a general overhauling, consisting of the installation of a new engine and mast, new woodwork, and cleaning and painting.

Conversion Job, New York.—The contract for the conversion of the steamship Ebro, of the Pacific Steam Navigation Company, for conversion from coal to oil burning has been awarded to the Todd Dry Dock plant of the Todd Shipyard Corporation. It is understood that the amount involved is over \$100,000.

Thorough Overhauling, Sparrows Point, Md.—The Chesapeake Steamship Company's steamer City of Norfolk has been placed on the ways of the Bethlehem Shipbuilding Corporation at Sparrows Point for a thorough overhauling, similar to that just completed on the company's steamship City of Baltimore.

Voyage Repairs, Oakland, Cal.—The Crowley Shipyard, Oakland, submitted the successful bid for voyage repairs to the freighter West Chopaka, at recent tender openings. Prices were as follows: Crowley, \$1,153; General Engineering, \$1,154; United Engineering, \$1,240; Bethlehem Shipbuilding, \$1,346; Smith-Scanlon, \$1,664.

Ship Repairs, Conneaut, Ohio.—The Pittsburg Steamship Company's barges Magna, Martha and Robeling are being fitted with new tank tops and side tanks at the Conneaut, Ohio, harbor. Several other boats of the company's fleet are under minor repairs. At Conneaut approximately 150 men are now employed in repair work.

Tankers Overhauling, San Francisco, Calif.—The Standard Oil tanker Captain A. F. Lucas has been taken to the Potrero drydock of the Bethlehem Shipbuilding Corporation for annual overhauling. As soon as the Lucas repairs are completed, the Colonel E. L. Drake, another Standard Oil tanker, will go on drydock for the same work.

Steamer Drydocked, Philadelphia, Pa.—The steamship Fagerstrand has been drydocked at the Philadelphia Ship Repair Company's yard, 641 Mifflin street. This vessel is the first ocean steamer to be drydocked at the Philadelphia Repair yard, which specializes in drydocking and repairing outgoing tugs, sailing vessels and small river craft.

Vessel Overhaul, Beaumont, Tex.—The contract for general overhauling and reconditioning of the United States dredge Edwin R. Kimble has been awarded to the Pennsylvania Shipyards, Inc., Beaumont, Tex., at a total cost of about \$20,000. The contract for reconditioning of the tug Wabash also has been awarded the Pennsylvania Shipyards at a price of \$16,000.

Conversion to One Cabin Ship, England.—An announcement has been made by Sanderson & Sons, Inc., agents for the Royal Mail Steam Packet Company, that the steamship Ohio will be converted into a one-cabin ship, beginning on April 19. The Ohio is the newest and most speedy of the company's four liners and has been operated as a regular three-class vessel.

Successful Bidder, San Francisco, Cal.—For general repairs and overhauling, the Bethlehem Shipbuilding Corporation, San Francisco, was successful

holder on the Associated Oil tanker Alden Anderson. The following companies submitted proposals: Bethlehem, \$3,480, six days; General Engineering, \$3,497, seven days; Moore Drydock Company, \$3,680, six days, and Main Iron Works, \$4,004, ten days.

Army Transport Repairs.—At the opening of tenders on the West Coast for repairs to the United States army transport Grant, consisting of improvements to the ship's auxiliary machinery and other minor repairs, drydocking, etc., two companies bid on the drydocking: Bethlehem Shipbuilding Corporation and Moore Drydock Company, the Bethlehem yard being awarded the contract.

Electric Equipment, New York.—The New York Central received bids at the office of C. S. White, purchasing agent, New York City, on March 14, for one 2,300 kilowatt synchronous converter, one 2,760 k.v.a. three phase oil cooled transformer and remote controlled automatic switchboard apparatus and one 2,000 k.w. synchronous motor generator set and remote controlled automatic switchboard apparatus.

Contract Awarded, San Francisco, Cal.—The contract for repairs to the Dollar freighter Virginia Dollar, which recently received damage to her shear strake and deck plating due to heavy weather, has been awarded to the Bethlehem Shipbuilding Corporation, San Francisco. A crew of men has been dispatched to Honolulu, where the vessel docked, and will complete the work in about thirty days.

Boilers, Erie, Pa.—The United States Engineer Office, Louisville, Ky., has awarded the contract for seven boilers for derrick boats, bids for which were reported in this bulletin of March 8, to the Pennsylvania Boiler Works, Erie, Pa., at \$13,160, f.o.b. Louisville, Ky. The boilers are to be of the Scotch marine "wet back" type, 60 boiler horsepower and 125 pounds pressure per square inch, with fixed steam dome, 30 inches by 30 inches.

Conversion to Oil Burner, New York.—The contract for general reconditioning and conversion of the steamship Virginia from coal to oil burning, complete tenders for which were reported in this bulletin of March 8, has been awarded to the Robins Dry Dock & Repair Company, Brooklyn, N. Y., by the Di Giorgio Fruit Corporation, Room 648, No. 25 Broadway, New York City. The work will start immediately and will cost \$38,732, according to the contract.

Battleships Overhauling, Norfolk, Va.—The Norfolk Navy Yard has been awarded the work of making annual repairs and overhauling the battleship U. S. S. Texas. It is expected extensive work will be done and that a large force of yard workmen will be busy until the latter part of April. When work is completed on the Texas, the battleship New York will take her place at the yard for annual overhaul, which will take until about the middle of June for completion.

New Salvage Ship for Pacific Coast, Vancouver, B. C.—It has been reported that the Pacific Salvage Company, Vancouver, is about to place a contract with the United Kingdom for the construction of a salvage steamer to replace the Algerine, at a cost of \$150,000. The new salvage vessel will be especially designed for the wrecking business and will have a steaming radius of 15,000 miles. She is to be 200 feet long with a speed of 18 knots, her engines being 3,000 horsepower, according to reports.

Standard Oil Steamers, Germany.—The Standard Oil Company of New Jersey has awarded the contract for the conversion of the steamers S. V. Harkness, Josiah Macy and Trontolite, from steam turbine to Diesel propulsion, to the Krupp Works, Germany, according to official information obtained by Marine Engineering and Shipping Age. Krupp two-cycle Diesel engines of approximately 2,150 brake horsepower will be installed in each ship. It is understood that proposals for this contract were asked from American firms recently, the returns from which are believed to have indicated an expenditure of about a million and a half dollars if the contract was placed in this country.

Shipyard Work, Mobile, Ala.—The Alabama Drydock & Shipbuilding Company, Mobile, has been awarded the following work: Steamship Steel Motor, installation of mechanical oil burning system and repairs to armature; steamship Paloma, condenser repairs, overhauling and repairing auxiliary feed and ballast pumps and deck winches; tug Von Ezzdorf, cleaning bottom and renewing copper sheathing, drawing tall shaft, installing new wheel of a type to materially increase vessel's speed and replacing old stern bearing with one of brass, etc.; steamship Afoundria, of the Waterman Steamship Company, sealing and painting deck tanks and renewing gaskets on same; steamer

Munisia, drawing of tall shaft for examination, repairing eight hull plates; steamship Republic, examination, scraping and painting; Texas Company's tanker Dirigo, examination and repairs due to grounding, ice, collision and heavy weather damage, and scraping and painting; machine work on steamship Stavangeren; barge, Coastwise, general overhauling; ferry steamer Estrada Palma, for examination of port and starboard tall shafts and scraping and painting from keel to deep load line, and steamship Steel Vendor, electrical work.

PORT IMPROVEMENTS

Wharf, Avalon, Cal.—Avalon City has preliminary plans prepared for addition to wharf, 20 by 150 feet, with two ells, to cost \$150,000.

Dock and Warehouse, Memphis, Tenn.—Memphis Dock & Forwarding Company, Memphis, plans to erect a dock and warehouse on the river front at Memphis.

Pier, Point Marion, Pa.—The McClain Sand Company plans timber and stone pier, 225 feet long, 25 feet wide, Point Marion. J. Cabbage, care owner, engineer.

Sea Wall, Waveland, Miss.—Election was held on March 20 for \$50,000 bonds for sea wall along entire length of town. Board of Supervisors, Hancock County, voted to assist.

Dock, Midland, Ont.—The Department of Public Works, Parliament Building, Ottawa, plans dock and dredging work in Midland Harbor. \$300,000. K. M. Cameron, chief engineer.

Floating Wharf, Louisville, Ky.—The Standard Sanitary Manufacturing Company, 6th and A Streets, Louisville, Ky., plans to build a floating wharf at the foot of 5th Street, Louisville.

Ferry Docks, Windsor, Ont.—Detroit & Windsor Ferry Company has awarded the contract for two cement and steel ferry docks to Considine & Reid, Ltd., Windsor. Engineers' estimate, \$300,000.

Clearing Channel, Newton, Kan.—Sand Creek Drainage District is making plans for clearing Sand Creek Channel. \$30,000. Ruckel Engineering Company, Interurban Building, Hutchinson, engineer.

Dredging, New Jersey.—State Highway Department, Trenton, plans dredging 7-mile inland waterway channel between Manahawkin and Beach Haven, Ocean County. \$150,000 voted for project.

Dredge Work, Sault Ste. Marie, Ont.—Department of Public Works, Ottawa, plans to spend \$100,000 for dredge work in St. Mary's River, Sault Ste. Marie. K. M. Cameron, chief engineer.

Dock Machinery, Cleveland, O.—The Erie Railroad Company, New York, plans improvements at its ore docks at Cleveland to cost \$500,000. It is said that ore unloading machinery will be installed.

Extension to Slip, New York, N. Y.—Bids were received on March 13 by the Constructing Quartermaster's Office, Room 510, 39 Whitehall Street, New York, for extending Governors Island ferry slip.

Crane, Cincinnati, Ohio.—The Cincinnati River-Rail Transportation Company, Front and Harriet Streets, plans to purchase a large gantry crane for river terminal at foot of Harriet Street, to cost over \$25,000.

Wharf Reconstruction, San Francisco.—The contract for furnishing materials and reconstructing the Islais Creek outer wharf, San Francisco, was awarded to the Clinton Construction Company by the Harbor Board.

Bonds for Harbor Improvements, Crescent City, Cal.—Del Norte County plans to vote on \$15,000 bonds as a portion of the county's cost in financing improvements to the harbor in conjunction with the United States Government.

Bulkhead, Bayonne, N. J.—Hudson County Park Commission, 1 Exchange Place, Jersey City, has awarded the contract for a bulkhead at Bayonne Park, here, to George B. Spearin, Inc., 90 West Street, New York City. \$230,950.

Canal, Louisiana.—Louisiana Gravity Canal, care W. Bradford, president, Alexandria, is having preliminary plans prepared for 25.5 mile canal connecting Red and Calcasieu Rivers, 138 miles through old beds of Red River and 117 miles through open table lands, excavation 9-foot average, embank-

ments 9-11 feet high, 50 feet wide at bottom, and five 110,020 horsepower hydro-electric power plants, etc. \$4,700,000. Private plans.

Dredging, Cuyahoga River, Great Lakes.—City manager W. R. Hopkins, of Cleveland, has let a contract to the Great Lakes Dredge & Dock Company, for dredging in the Cuyahoga River, at \$61,000; this amount of work to be done annually.

Harbor Improvements, Toronto, Ont.—Harbor Commission, Harbor Building, plans to expend \$300,000 for improvement of harbor, concrete retaining walls, dredging and hydraulic filling. E. L. Cousins, Harbor Building, construction engineer.

Dredging, Milwaukee, Wis.—Bids were received on March 20 by the Department of Public Works, for dredging several rivers, canals and channels as may be ordered by the Commissioner of Public Works during season ending December 1. \$45,000. J. Schwada, City Hall, engineer.

Surveys of River, Chatham, Ont.—The Department of Public Works, Parliament Building, Ottawa, is having surveys made of the Thames River from Chatham to the mouth, with the object of dredging same for canal traffic, about 15 miles involved. \$100,000. E. M. Cameron, chief engineer.

Wharves, etc., Sacket Harbor, N. Y.—The Standard Oil Company of New York, 28 Broadway, New York City, has purchased site at Sacket Harbor, including railroad and lake frontage, and plans wharves, breakwater, rail facilities, storage tanks, etc., for complete storage system. Cost to exceed \$200,000.

Terminal Facilities, Louisville, Ky.—The Inland Waterways Company, 316 West Jefferson Street, plans extensive terminal facility on the river front between Clay and Floyd Streets, including concrete retaining wall, 25 by 1,100 feet, 150-foot railroad trestle, etc. \$100,000. Rogers & Read, 310 Realty Building, engineers.

Contract Awarded, Norfolk, Va.—The contract for dredging the approach to channel 1 1/4 miles in Pamlico Sound and 1/2-mile canal from sound to ocean, 250 feet wide, at New Inlet, has been awarded to Calkins Dredging Company, Norfolk, Va., by the North Carolina Fisheries Commission, at an estimated cost of \$70,000.

Dock Contract, Cleveland, O.—It is announced in Cleveland that the Thunder Bay Harbor Improvement Company has been awarded the contract for the construction of a dock having a 250-foot frontage and with 500 feet of trestle work for the Thunder Bay Pulp and Paper Company, which operates a pulp mill on the north Port Arthur waterfront.

Oil Terminal, Memphis, Tenn.—The Pan-American Southern Petroleum Company has purchased the old unloading dock of the Sugar Products Company, at California Street, Memphis, Tenn. The Oil Company plans an investment of \$250,000 at this site, two 15,000-barrel oil tanks and a new pump house to be erected. Self-propelled oil barges will probably be put into service on the Mississippi River by this company.

Loading Machine, Conneaut, O.—Two new electric Hulett loading machines will be set up in the Conneaut, Ohio, harbor this spring. The machines will be put up by the Wellman-Seaver-Morgan Company, of Cleveland. They will be the largest and fastest on the Great Lakes and will have a bucket capacity of 17 tons, making the round trip every 50 seconds. They will supplant four hydraulic Hulett machines which have been used for years.

Terminal Facilities, Louisville, Ky.—The Inland Waterways Company, 316 West Jefferson Street, Louisville, Ky., plans to build extensive terminal facilities on the river front at Louisville between Floyd and Clay Streets, the work involving a railroad trestle, a large amount of fill, concrete retaining wall and tracks. The retaining wall is to be 1,100 feet long, 25 feet high, and have pile foundation. Rogers & Read, 410 Realty Building, Louisville, engineers.

Supply Contracts, St. Paul, Minn.—The following contracts have been awarded by H. W. Austin, city purchasing agent, St. Paul: traveling crane, 7.5 ton capacity, to Conkey & Co., Conkey and Calumet Avenues, Chicago, \$4,050; 1,524 ounces cold rolled copper expansion plates, 270 cast aluminum forms, to Farwell, Ozmun Kirk & Co., 2nd and Jackson Streets, \$6,797; furnishing and driving 637 piles between Mississippi River and Charles Lake, to Chermus Construction Company, 724 Plymouth Building, Minneapolis, \$10,000.

GOVERNMENT WORK

Dredging Pump, Savannah, Ga.—U. S. Engineer, Savannah, is in the market for one 12-inch dredging pump.

Steel Gates, Florence, Ala.—The Florence Engineer Office plans to purchase 58 steel regulating gates, 18 by 38 feet, for Wilson Dam.

Oil Wharf, Mare Island, Cal.—Specification 4950—Bureau of Yards & Docks, Navy Department, Washington, D. C., plans oil wharf, here.

Dike, Mare Island, Cal.—Specification 4960—Bureau of Yards & Docks, Navy Department, Washington, D. C., plans reconstructing Dike 14.

Steel Hull Boats, Louisville, Ky.—U. S. Engineer, Louisville, will take bids about April 1 for two steel hull maneuver boats, one for the Huntington district.

Sand Pumps, Portland, Ore.—U. S. Engineer, Portland, awarded a contract for two sand pumps to Smith & Watson Iron Works, Inc., 400 Front Street, \$7,791.

Lock, Pittsburgh, Pa.—U. S. Engineer Office, Pittsburgh, plans to enlarge Lock No. 5, Monongahela River, and extend concrete guide walls several hundred feet.

Breakwater Pier, Hampton Roads, Va.—Specification 4944—Bids will be received by the Bureau of Yards & Docks, Navy Department, Washington, D. C., for repairs to north breakwater pier.

Jetty, Jacksonville, Fla.—U. S. Engineer, Jacksonville, awarded the contract for repairing jetty at entrance to St. Johns Harbor, to the Seaboard Dredging Company, Durkee Building, \$117,120.

Steel, Milwaukee, Wis.—The Calumet Steel Company, 208 South La Salle Street, Chicago, has been awarded a contract by the U. S. Engineer Office, Milwaukee, for 672,400 pounds of reinforcing steel, at \$15.655.

Sheet Piling, Louisville, Ky.—U. S. Engineer, Louisville, has awarded the contract for furnishing steel sheet piling for Dams 45 and 46, Ohio River, to Carnegie Steel Company, Carnegie Building, Pittsburgh, \$8,657.

Crane, Florence, Ala.—U. S. Engineer, Florence, awarded the contract for furnishing and erecting one electric traveling crane for Wilson Dam, to Niles-Bement-Pond Company, 111 Broadway, New York City, \$33,450.

Dredging, Tex.—The Gulf Refining Company, Port Arthur, Tex., was low bidder at 39.5 cents per cubic yard for dredging in Sabine-Nechez waterway, Tex., on bids opened by the U. S. Engineer Office, Galveston, Tex.

Jetty Construction, Wilmington, Del.—U. S. Engineer, Wilmington, Del., will receive sealed proposals until 11 a. m., April 14, 1924, for furnishing and delivering stone for jetty construction. Further information on application.

Dredging, Hackensack River, N. J.—Bids will be received until April 4 by the U. S. Engineer, Army Building, New York City, for dredging 200,000 square yards of soft materials, and 2,000 cubic yards rock removal in Hackensack River, N. J.

Operating Machinery, Huntington, W. Va.—The contract for valve operating machinery for Dam 32, Ohio River, has been awarded by the U. S. Engineer Office, Huntington, to J. and J. B. Milholland Company, 714 Fifth Avenue, Pittsburgh, Pa. \$45,500.

Steel Sheet Piling, Addison, Ky.—The Carnegie Steel Company, Carnegie Building, Pittsburgh, Pa., has received the contract awarded by the U. S. Engineer Office, P. O. Box 72, Louisville, for furnishing 300 tons of sheet steel piling, at a price of \$57 per ton.

Soft Steel Bars, Owensboro, Ky.—U. S. Engineer, P. O. Box 72, Louisville, awarded the contract for furnishing 3,200 soft steel round bars, 3½-inch in diameter, 22 feet long, for Dam 46, Ohio River, to Bourne-Fuller Company, 1105 Union Trust Building, Cincinnati, Ohio, at \$2.81 per 100 pounds.

Stone Riprap, Harbor Beach Harbor, Mich.—Sealed proposals will be received until 11 A. M., eastern standard time, April 18, 1924, by U. S. Engineer, Detroit, Mich., for recovering and replacing stone riprap at Harbor Beach Harbor, Mich. Further information on application.

Dredging, San Diego, Cal.—Specification 4885—Bureau of Yards & Docks, Navy Department, Washington, D. C., has awarded the contract for dredging at the Marine Railroad Naval Operating Base, San Diego, to the San Francisco Bridge Company, 14 Montgomery Street, San Francisco, \$7,500.

Excavation, Wilmington, Del.—Sealed proposals will be received until 11 A. M., April 19, 1924, by the U. S. Engineer, Wilmington, Del., for excavating in inland waterway from Delaware River to Chesapeake Bay, Delaware and Maryland (Chesapeake and Delaware Canal). Further information on application.

NEW INCORPORATIONS

Toledo Shipbuilding Company, capital \$6,000,000, chartered under Delaware laws.

Philadelphia Steamship Corporation, capital \$50,000, chartered under Delaware laws.

Nicholson Universal Steamship Company, of Wilmington, capital \$100,000, chartered under Delaware laws.

Barge Canal Dry Dock, of Buffalo, capital \$25,000, chartered at Albany. Incorporators: B. L. Cowes and J. E. Matton.

Equity Products Corporation, chartered at Albany, to engage in shipping. Incorporators: J. Welsh, J. E. Desmond, and J. A. Guedella.

Richardson Boat Company, of North Tonawanda, N. Y., capital \$50,000, chartered at Albany. Incorporators: G. R. Richardson, R. G. Hatch and J. G. Nogle.

Columbia Lighterage Company, of Manhattan, with 1,000 shares of common stock, no par, chartered at Albany. Incorporators: J. S. Gottfried, J. C. Fell and N. H. Forst.

The Fairmont Steamship Company, of Mentor, Ohio, has been incorporated with a capital of \$350,000. The incorporators include William L. David, Cleveland attorney; G. W. Cotterell, Alfred Kelley, Rose Cone and N. J. Webster.

American Transport Corporation, capital \$25,000, chartered under Delaware laws for the purpose of purchasing steamers. Officers: George W. Sterling, president; Thomas Eckert, vice-president; Addison Atwater, secretary; W. S. Silver, treasurer.

Announcement has been received in Cleveland of the formation of the Saginaw Bay Steamship Company at Saginaw Bay, Michigan, with a capital of \$300,000. The officers are: President and general manager, Charles W. Stivor; vice-president, John L. Jackson, and secretary and treasurer, Walter C. Hill. A packet steamer has been purchased and plans have been made to start her in service between Saginaw, Bay City, Detroit, Port Huron and Cleveland in the spring.

MARINE SOCIETIES

AMERICA

American Society of Naval Engineers
Navy Department, Washington, D. C.
Secretary-Treasurer—Commander Bryson Bruce,
U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.

Society of Naval Architects and Marine Engineers
29 West 39th Street, New York
Secretary and Treasurer—Daniel H. Cox.

National Association of Engine and Boat Manufacturers
29 West 39th Street, New York City
Secretary—R. R. A. Hand.

United States Naval Institute
Naval Academy, Annapolis, Md.
Secretary and Treasurer—Commander H. K. Hewitt, U. S. N.

American Marine Association
15 Park Row, New York
President—Frank J. Shipman.

The New York Tow Boat Exchange
11 Moore St., New York
Secretary—Irving G. Keller.

Port of New York Authority
11 Broadway, New York
Chairman—E. H. Outerbidge.
Secretary—William Leary.

National Association of Masters, Mates and Pilots
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American Society of Marine Designers
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National Marine Engineers' Beneficial Association
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Lake Carriers' Association
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Institution of Engineers and Shipbuilders in Scotland
39 Elmbank Crescent, Glasgow.

Northeast Coast Institution of Engineers and Shipbuilders
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Institute of Marine Engineers, Incorporated
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